Conservation Plan
for the
Samaria Landscape Zone

Biodiversity Action Planning
in the
Mid Goulburn

Victoria
The Place To Be
Department of Sustainability and Environment
Department of Primary Industries
Trust for Nature
GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY
Australian Government

Developed By:

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Front cover: Broken River, Lima South
Inset: Powerful Owl Photos: Rowhan Marshall, Paul Gullan (Viridans)

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EXECUTIVE SUMMARY

The **ultimate aim** of Biodiversity Action Planning (BAP) is to achieve broad-scale conservation of native biodiversity. BAP identifies priorities for the conservation of native biodiversity, as part of the implementation of the Victorian Biodiversity Strategy 1997. It is not a 'stand-alone' project; rather a process for translating objectives set out in Victoria's Biodiversity Strategy to regional, catchment and local level (Victoria's Biodiversity Strategy fulfils a statutory requirement under Section 17 of the *Flora and Fauna Guarantee Act 1988* and provides the biodiversity action plan for Victoria).

To **translate objectives** from state to regional, catchment and local landscape level, Victoria was first divided on a bioregional basis (bioregions) and then at a landscape level (landscape zones). The 'Victorian Riverina Bioregional Plan' and the 'Mid Goulburn Region North Landscape Zone Plan' outline biodiversity priorities at the bioregional level. This 'Samaria Landscape Zone Conservation Plan' has been developed at the local (landscape) level and is intended to assist government agencies (primarily extension staff) and the community, to work in partnership towards achieving catchment targets, by setting priority areas for protection and enhancement of native biodiversity. This plan is also intended to enable biodiversity priorities, data and advice, to be disseminated through existing planning processes, to landholders and agencies.

The **methodology** used to develop this plan is according to the 'Developer's Manual for Biodiversity Action Planning in the Goulburn Broken Catchment (GBCMA 2004a)'. Two important components of the BAP process, are the 'focal species' approach and the 'key biodiversity assets' approach. The **focal species** approach uses the habitat requirements of a particular species, or a group of species, to define the attributes that must be present in a landscape, for these species to persist. Six focal species have been identified in the Zone: Speckled Warbler, Regent Honeyeater, Powerful Owl, Grey-crowned Babbler, Bush-stone Curlew and River Blackfish. These focal species have been chosen in order to promote the uptake of actions, for conservation within the Zone.

The **key biodiversity asset** approach is a method of grouping biodiversity assets (eg. birds, animals and plants) that use the same type of habitat. Five key biodiversity assets were identified for the Samaria Zone, Riparian Systems, Box Ironbark Forest, Dry Slopes and Ridges, Valley Grassy Forest and Herb-rich Foothill Forest. The grouping of these assets will assist in targeting the very high value sites first, down to the lowest priority sites.

The **Samaria Landscape Zone** is located within the Goulburn Broken Catchment of Victoria. The Zone, which is approximately 111,000 hectares, covers sections of the Central Victorian Uplands and Highlands-Northern Fall bioregions, and the Local Government area of Mansfield and Rural City of Benalla. Since European settlement much of the vegetation in the valleys and plains has been cleared, leaving a fragmented landscape, with many of the remnants significantly modified.

Within the Samaria Landscape zone 67 **priority environmental sites** have been identified. These priority sites have been determined and ranked (very high, high, medium or low) based on factors such as, size, quality, Ecological Vegetation Class (EVC) conservation status, threatened species, landscape context and field surveying. These sites contain remnant vegetation and vary greatly in size, from a stand of paddock trees, to large core areas such as Mount Samaria State Park.

Management actions (advisory only) have been developed for the Samaria Landscape Zone, based on the results of desktop analysis and surveying. It is intended that government agencies and the community, work together to incorporate these actions, in to existing projects/strategies, for the benefit of biodiversity conservation in the Samaria Landscape Zone, as well as the Mid Goulburn Region and the Goulburn Broken Catchment.

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1.0 BACKGROUND

Figure 1: BAP Process

1.1 INTRODUCTION

The ultimate aim of Biodiversity Action Planning[1] (BAP) is to achieve broad-scale conservation of native biodiversity. BAP identifies priorities for the conservation of native biodiversity, as part of the implementation of the Victorian Biodiversity Strategy (Crown 1997). In particular, it aims to:

- Conserve native biodiversity[2] by maintaining viable examples of the range of ecosystems that occur naturally in Victoria,
- Promote a more strategic and cost-effective expenditure of public funds for the protection, restoration and ongoing management of priority biodiversity sites
- Achieve community support for biodiversity landscape planning and the conservation of strategic assets, in rural landscapes (Platt & Lowe 2002).

In order to achieve these aims, effective planning for native biodiversity also requires detailed planning at a bioregional and landscape level. Therefore, Victoria was first divided on a bioregional basis (Appendix 1) and then at a landscape level (landscape zones)(Appendix 2).

At the regional scale the 'Bioregional Strategic Overview for the Victorian Riverina Bioregion' and the 'Landscape Plan for the Goulburn Broken CMA - Mid Goulburn Region - North Zones', identifies the broad priorities for biodiversity conservation in the region. They also provide the foundation for producing detailed plans, such as the 'Samaria Landscape Zone Conservation Plan (Anderson et al 2003). At the landscape level, this Samaria Landscape Zone Conservation Plan, is intended to provide a biodiversity conservation resource for the community at a local level. Figure 1 illustrates the BAP process and where the Samaria Landscape Zone Conservation Plan (highlighted in red) fits within a policy context.

1.2 OBJECTIVES

The 'Samaria Landscape Zone Conservation Plan' has been developed at the local (landscape) level and is intended to assist government agencies (primarily extension staff) and the community, to work in partnership towards achieving catchment targets. This plan aims to ensure that private and public resources expended for conservation are targeted to priority sites. In this way, available resources can be used for the greatest possible outcomes. There are 67 priority sites, identified in the Samaria Zone, ranging across very high, high, medium or low value. The protection and management of these priority sites, is important for the conservation of flora and fauna in the local area.

Broadly, this plan details:

- The landscape, vegetation and significant flora and fauna of the Samaria Zone,
- Conservation vision for the Samaria Landscape Zone,
- Priority assets to be conserved, their biodiversity value and threatening processes,
- Actions to protect and restore these assets, and
- Monitoring opportunities for the Zone.

[1] For further information on Biodiversity Action Planning visit the Department of Sustainability and Environment website at www.dse.vic.gov.au
[2] Biodiversity: the natural variety of life: the sum of our native plants and animals, the genetic variations they contain, and the natural ecosystems they form (NRE 1997)

1.3 CONTEXT FOR DEVELOPING THE SAMARIA CONSERVATION PLAN

The Goulburn Broken Regional Catchment Strategy (GBRCS) identifies a vision for biodiversity in the catchment. The vision is that "the community will work in partnership with Federal and State Governments and other agencies, to protect and enhance ecological processes and genetic diversity, to secure the future of native species of plants, animals and other organisms in the catchment" (GBCMA 2003 p87). This Samaria Landscape Conservation Plan is to assist in achieving this vision, through providing a strategic coordinated approach, for conservation of priority assets.

The GBRCS also identifies targets and priorities for the catchment (refer to Appendix 3 for further detail). The following points are intended to provide a summary of the Goulburn Broken Regional Catchment Strategy targets and priorities for biodiversity conservation. For further information please refer to GBCMA 2003.

The Goulburn Broken Catchment Management Strategy identifies the following biodiversity resource condition targets for native vegetation in the catchment:

1. Maintain the extent of all native vegetation types at 1999 levels in keeping with the goal of 'Net Gain' listed in Victoria's Biodiversity Strategy 1997,
2. Improve the quality of 90% of existing (2003) native vegetation by 10% by 2030,
3. Increase the cover of all endangered and applicable vulnerable Ecological Vegetation Classes to at least 15% of their pre-European vegetation cover by 2030,
4. Increase 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030,
5. Maintain the extent of all wetland types at 2003 levels where the extent (area and number) has declined since European settlement, and
6. Improve the condition of 70% of wetlands by 2030, using 2003 as the benchmark for condition (GBCMA 2003 p11).

Priorities for action to conserve biodiversity in the Goulburn Broken are driven by the conservation significance of the biodiversity asset. Regional investments in biodiversity conservation in the Goulburn Broken Catchment are driven by the following goals (in order of priority):

1. **Protecting** existing viable remnant habitats and the flora and fauna populations they contain (ie through reservation, covenants, management agreements, fencing and statutory planning),
2. **Enhancing** the existing viable habitats that are degraded (management by controlling threats such as pest plants and animals, grazing, salinity, promotion of natural regeneration and/or revegetation with understorey), and
3. **Restoring** under-represented biodiversity assets to their former extent by revegetation (to create corridors, buffers, patches of habitat) (GBCMA 2003).

It is intended that the actions outlined in this plan will complement the targets of the GBRCS and other policy/strategies pertinent to the state, catchment and region (eg. Victoria's Native Vegetation Management – A Framework for Action (NRE 2002a): Goulburn Broken Native Vegetation Management Plan (GBCMA 2000): and the Victorian River Health Strategy (NRE 2002b). This plan is also intended to integrate such policies (eg. targets and legislative requirements) in to the one document, for use by local communities. For example, this plan incorporates aspects of legislation (eg. Action Statements prepared under the Flora and Fauna Guarantee Act 1988), and recommended on-ground actions, for the conservation of threatened species and communities.

The Biodiversity Action Planning (BAP) process uses current scientific knowledge to produce an 'ideal' landscape for biodiversity conservation. This 'ideal' landscape provides for the current levels of species abundance, diversity and interactions. BAP attempts to take a strategic approach to the conservation of threatened and declining species and vegetation types, by looking for opportunities to conserve groups of species in appropriate ecosystems (Platt & Lowe 2002). It is therefore intended that this Landscape Zone Conservation Plan will assist government agencies and the community, to work in partnership towards achieving catchment targets and an 'ideal' landscape, by setting priority areas for protection and enhancement of native biodiversity.

This plan is not intended to be a method of 'taking over' land, but rather a resource document, that assists with identifying priority assets and methods of action, to protect or restore valuable assets, through voluntary extension principles. This document may be used by agencies and community groups, for informing existing projects and for strategic planning. However, it must be remembered that this document is by no means 'comprehensive', as the BAP process relies on the regular updating of information, to keep it accurate and timely. The plan has therefore been developed as an adaptive plan, to enable management actions and information to be modified, in response to further information (eg monitoring).

This plan will be reviewed when necessary to ensure that it remains a 'living' document. It is also intended that extension staff will use Geographic Information System (GIS) programs, databases and DSE/DPI staff, to fully identify and understand the BAP process and to provide further information to the community. Consultation and extension with relevant stakeholders, including agencies and community groups, was conducted (and will continue to occur) throughout the development and implementation of this plan. It is envisaged that this plan will be a valuable resource, for identifying priority biodiversity sites and initiating further conservation works in the Zone, and at a later stage, will lead to further sites and projects being identified by interested individuals and groups.

2.0 THE STUDY AREA

2.1 LANDSCAPE

The Samaria Landscape Zone covers an area of 111,000 ha, and contains sections of the Central Victorian Uplands and Highlands-Northern Fall Bioregions, within the Goulburn Broken Catchment (Figure 2). Main towns within the zone include Swanpool, Tolmie and Tatong and the zone crosses the Local Government areas of Mansfield and Rural City of Benalla. It is bounded to the North by the distinction between the Central Victorian Uplands and Victorian Riverina and to the south by the interface between Lake Eildon and the Jamieson Landscape Zones.. The Midlands Highway is the major regional roads traversing the Zone north to south. Over 44% of native vegetation cover has been cleared within the zone and the majority of the remnant vegetation occurs on public land (Mount Samaria State park), roadside and riparian strips, or as scattered remnants.

Private land covers 61% of the zone (CGDL 2005). Clearing in the zone has mainly been associated with the plains and valley floors. Extensive areas of private land occur from Lurg to Glenrowan West in the north and Nillahcootie to Tabletop in the south. The native vegetation remaining on private land is generally fragmented, and usually highly disturbed.

Public land covers the remaining 39% of the Zone and is predominantly associated with State Forest (6,500ha) and reserves such as Mount Samaria (7,600ha). The waterways and roadsides contain important habitat elements, such as large old trees and a diversity of structure, as well as providing important linkages across landscapes.

A large area in the eastern side of the zone associated with Toombullup State Forest was burnt by wildfire in 2007.

Severely burnt Herb-rich Foothill Forest near Tatong. Photo: Rowhan Marshall

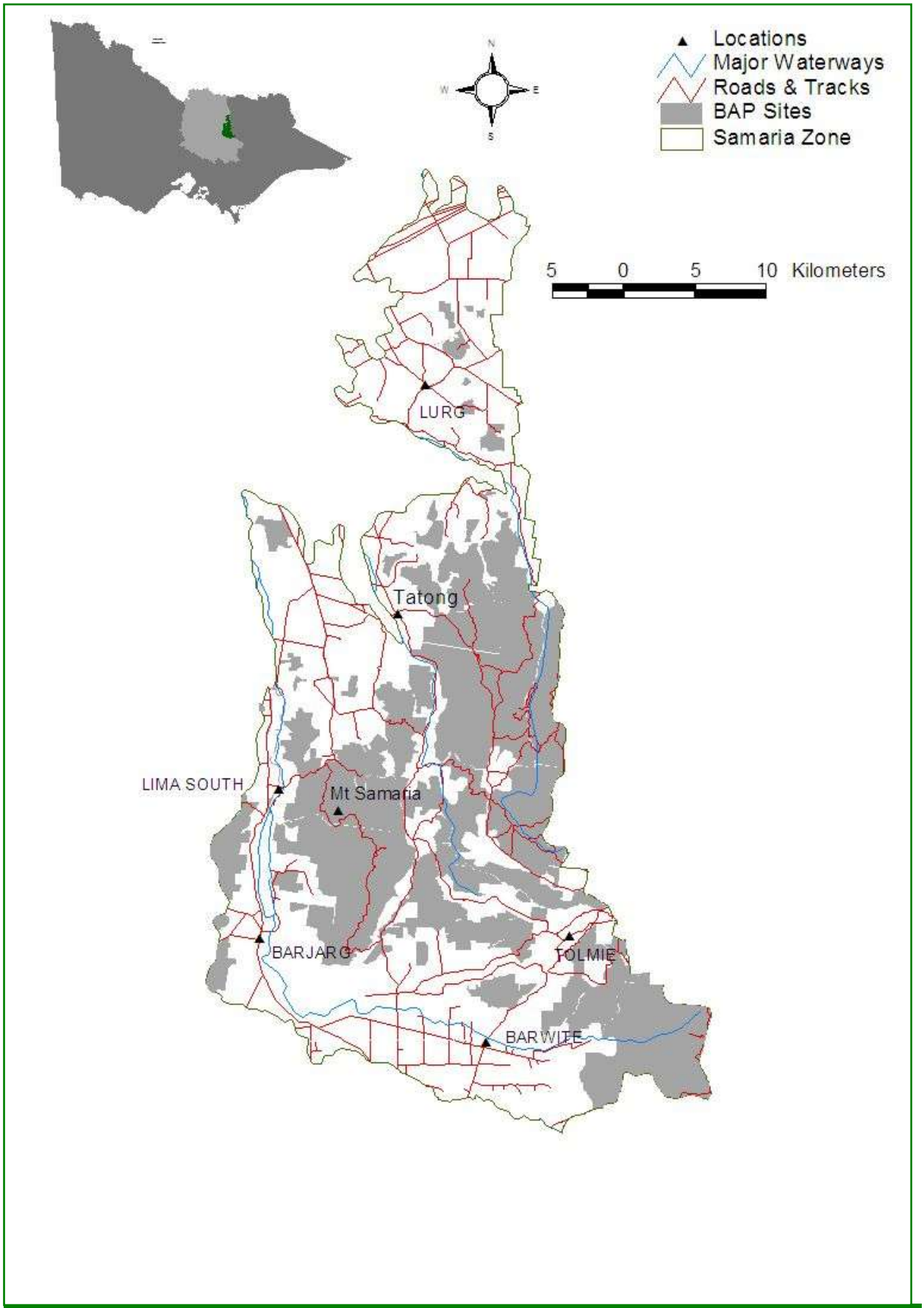

Figure 2: Samaria Landscape Zone

2.2 VEGETATION

Ecological Vegetation Classes (EVCs) are a vegetation classification system, derived from groupings of vegetation communities based on floristic, structural and ecological functions. Mosaics (combinations of EVCs) are a mapping unit, where the individual EVCs could not be separated, at the scale of 1:100,000 (Berwick, 2003).

Prior to European settlement, 23 EVCs were known to have been present within the Samaria Landscape Zone (Figure 3). The most wide spread EVCs were Herb-rich Foothill Forest, Grassy Dry Forest, Valley Grassy Forest and Heathy Dry Forest.

Herb-rich Foothill Forest dominated the Highlands – Northern Fall bioregion within this zone and remains significantly represented throughout the Tatong State Forest blocks. Riparian and Damp Forest still occur along Ryan's Creek within the State Forest.

Box Ironbark Forest and Gilgai Plains Woodland/Wetland Mosaic around Glenrowan West in the Lurg hills have been heavily cleared. The southern reaches of the zone outside State Forest are predominantly private land, and subsequently the riparian environments have suffered from extensive agricultural land use.

Waterways and wetlands are important biodiversity features within the Samaria Landscape Zone. Major waterways include Broken River, Holland and Ryan Creeks. A number of significant water storages include Lake Nillacootie, Loombah Weir and McCallsay Reservoir.

There has been selective clearing of EVCs with drier areas less cleared than those EVCs associated with more fertile soils. Of the 23 EVCs thought to occur in the zone prior to settlement, 13 (56%) are considered to be Endangered or Vulnerable, two Depleted (Heb-rich Foothill Forest Forest; Grassy Dry Forest) and seven EVC are of Least Concern (See GBCMA 2000 for details of categories). The Goulburn Broken Native Vegetation Plan describes goals and targets that have been set for the vegetation communities within the catchment. This includes ensuring that all EVCs are at least 15% of the pre-European cover by 2030 (GBCMA 2000). Seven of EVC within the Samaria Landscape Zone are below the 15% target (Table 1). Therefore, revegetation in this zone could be used to help achieve bioregional targets. For further details on each EVC contact GBCMA or DSE staff.

The current extent of native vegetation in the Samaria Zone has significantly reduced (Figure 3 & 4) since European settlement, primarily due to clearing. Table 1 identifies the EVCs in the Samaria Landscape Zone, including their Bioregional Conservation Status (BCS), their pre-European settlement extent and current (as of 2003) extent (in hectares and % cover).

The Goulburn Broken Regional Catchment Strategy (RCS) identifies goals and targets that have been set for the vegetation communities within the catchment (Appendix 3). This includes "increasing the cover of all 'Endangered' and 'Vulnerable' (where applicable[4]) EVCs to at least 15% of their pre-European vegetation cover by 2030" (GBCMA 2003). The majority of EVCs (14) within the Samaria Landscape Zone meet the 15% target (Table 1). There are 7 'Endangered' EVCs and 4 'Vulnerable' EVCs at the Bioregional level (Anderson et al 2003).

[4] Applicable to Ecological Vegetation Classes that are 'Vulnerable' and are below 15%

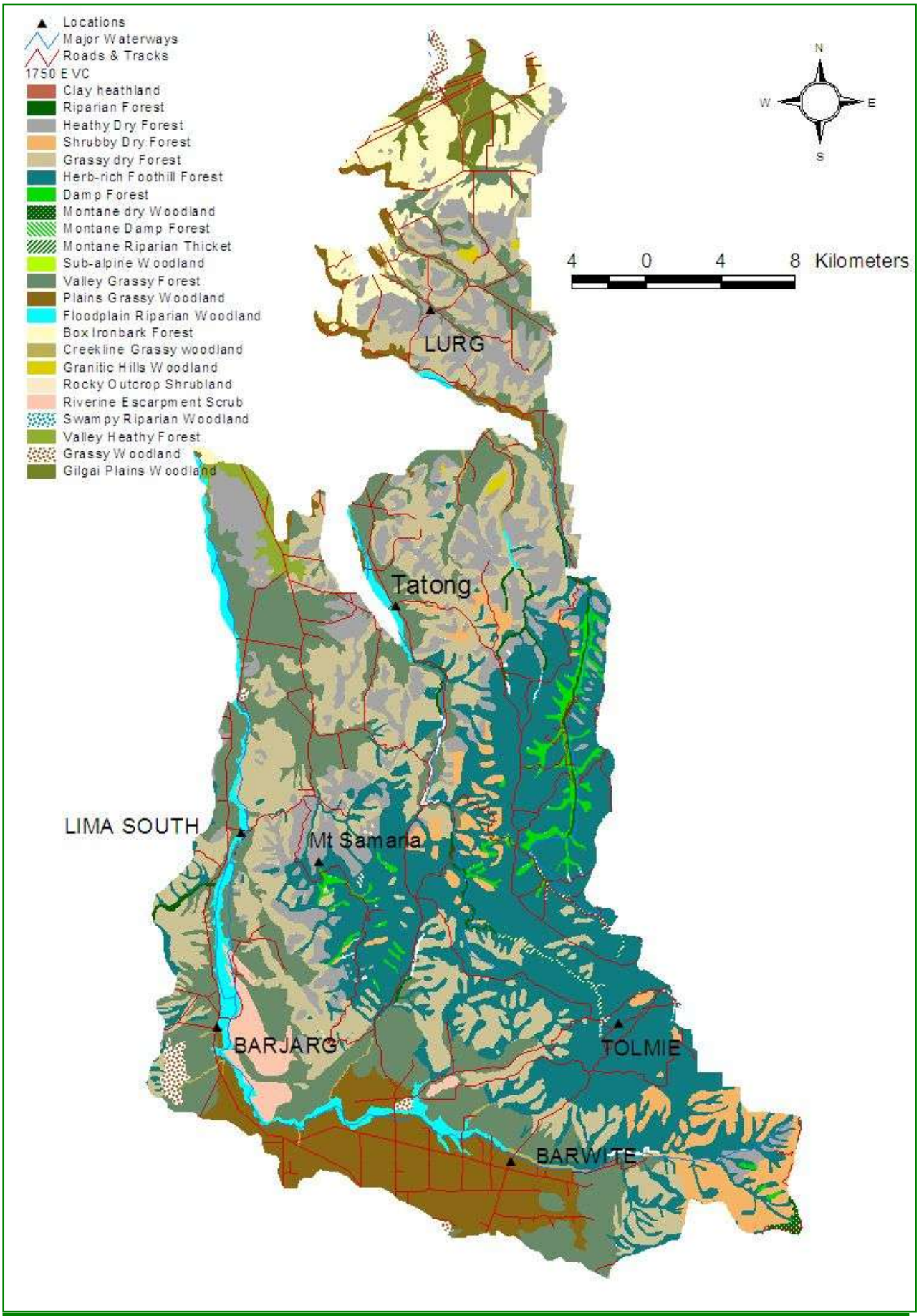

Figure 3: Pre 1750 distribution of EVCs

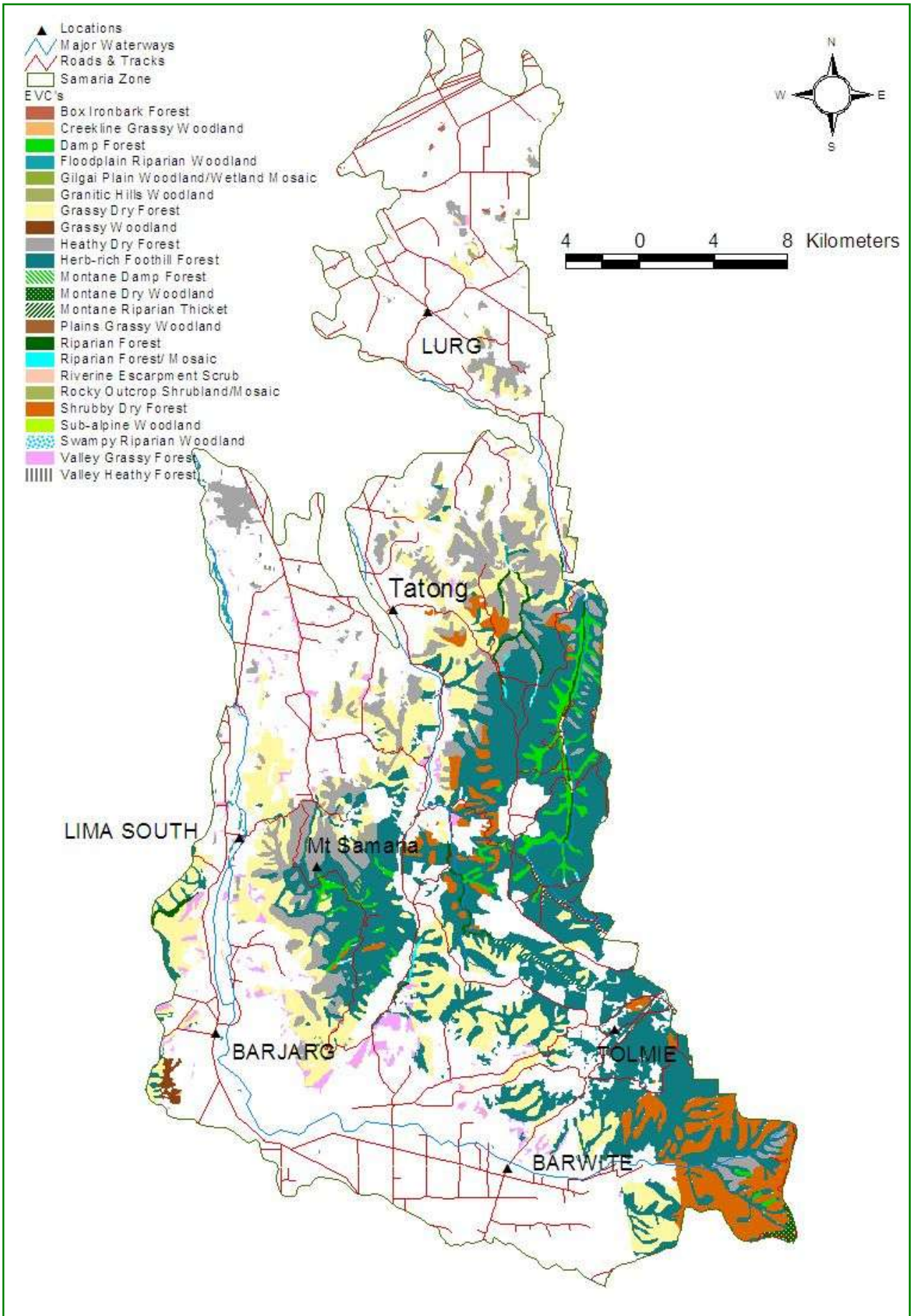

Figure 4: Current distribution of EVCs

Table 1: Samaria Zone Ecological Vegetation Classes (pre-1750 and current)

EVC Group	EVC Number	EVC Bioregional Conservation Status	Ecological Vegetation Class (EVC) Name#	Pre-1750 Vegetation Area (ha)	Current Area of Vegetation (ha)	Current Area of Vegetation (%)	Catchment (15%) Target (ha)*
6	23	CVU-D, HNF-LC	Herb-rich Foothill Forest	28137	21570	76	4215
6	22	CVU-D, HNF-LC	Grass Dry Forest	22767	12260	54	3402
6	47	CVU-V	Valley Grassy Forest	21170	1489	7	3165
6	20	CVU-LC, HNF-LC	Heathy Dry Forest	13556	7919	58	2025
14	55	CVU-E	Plains Grassy Woodland	8074	9	0.1	1200
4	61	CVU-V	Box Ironbark Forest	4528	59	1.3	675
6	21	CVU-LC, HNF-LC	Shrubby Dry Forest	4083	3818	93	600
15	56	CVU-E	Floodplain Riparian Woodland	1925	160	8	285
14	235	CVU-E	Gilgai Plain Woodland/Wetland Mosaic	1625	1	.06	240
21	82	CVU-E	Riverine Escarpment Scrub	1470	8	0.5	220
7	29	CVU-LC, HNF-LC	Damp Forest	1445	1417	98	216
6	127	CVU-E	Valley Heathy Forest	821	68	8	120
5	175	CVU-E	Grassy Woodland	712	154	21	105
15	68	CVU-E	Creekline Grassy Woodland	535	20	3.7	75
9	18	CVU-V, HNF-LC	Riparian Forest	653	479	73	90
8	41	HNF-LC	Montane Riparian Thicket	255	177	69	37
4	72	CVU-V	Granitic Hills Woodland	229	89	39	33
8	83	HNF-V	Swampy Riparian woodland	120	102	85	18
11	36	HNF-LC	Montane Dry Woodland	112	112	100	16
9	84	CVU-V, HNF-D	Riparian Forest/Swampy Riparian Woodland/Riparian Shrubland…	184	54	29	27
21	73	CVU-LC, HNF-R	Rocky Outcrop Shrubland/Herbland Mosaic	38	38	100	6
12	43	HNF-LC	Sub-alpine Woodland	6	6	100	0.9
			TOTAL	**110695**	**50009**	**1023**	**16770**
Table Information including column A & B modified from Anderson et al 2003 & CGDL 2005				*A*	*B*	*C*	*D*

Column C derived from (column B divided by column A) multiplied by 100 (for %)

Column D derived from (column A divided by 100) multiplied by 15

 # EVC names have altered since Anderson et al 2003 & are listed according to current corporate date (CGDL 2005)

Explanation of Terms:

- 'EVC Number' refers to the unique number attributed to that EVC in available literature (eg. CGDL 2005).
- 'EVC Bioregional Conservation Status' (BCS) refers to the threatened status of the EVC in the bioregion. Endangered (E) means that 'less than 10% of the pre-European extent remains, whilst Vulnerable (V) is defined as 'less than 10-30% pre-European extent remaining' (Platt 2002). Highlands – Northern Fall (HNF), Central Victorian Uplands (CVU).
- 'Ecological Vegetation Class (EVC) Name' is the name given to that unique community.
- 'Pre-1750 Vegetation Area' refers to the area of vegetation cover (ha) prior to substantial clearance (eg. Pre-European Settlement).

2.3 SIGNIFICANT FLORA AND FAUNA

2.3.1 Flora:

Photo: Chocolate Lily (Arthropodium strictum) (NRE 2002e)

Nearly 1000 flora species are associated with the Samaria Zone. On the plains overstorey species include: River Red Gum (*Eucalyptus camaldulensis*), Grey Box (*Eucalyptus microcarpa*), White Box (*Eucalyptus albens*), Yellow Box (*Eucalytpus melliodora*), and Buloke (*Allocasuarina luehmannii*).
The range of small trees and shrubs include: Gold-dust Wattle (*Acacia acinacea*), Golden Wattle (*Acacia pycnantha*), Sweet Bursaria (*Bursaria spinosa*) and Gorse Bitter-pea (*Daviesia ulicifolia*).

The Samaria Zone contains a range of groundcover plants including Wallaby Grass (*Austrodanthonia spp*), Kangaroo Grass (*Themida triandra*) Flax Lilies (*Dianella* spp.). Plants that favour wetter environments, such as Drumsticks (*Pycnosorus globosus*), Thatched Saw-sedge (*Gahnia radula*) and Brown-back Wallaby-grass (*Austrodanthonia duttoniana*) may also be found.(Earl *et. al.* 2001).

There are 37 species of threatened flora, recorded within the Samaria Landscape Zone (Viridans 2005). These species are noted in Appendix 4, along with their threatened status (as per the Flora Information System), the State Level *(Flora and Fauna Guarantee Act (FFG Act) 1998)* and the National Level (*Environmental Protection and Biodiversity Conservation Act (EPBC) 1999*) (Anderson et al 2003).

Examples of threatened flora recorded in the Samaria Landscape Zone include:

- Crested Sun-orchid (*Thelymitra X irregularis*) (rare in Victoria)
- Dookie Daisy (*Brachyscome gracilis*) (vulnerable in Victoria and listed under FFG)
- Highland Bush-pea (*Putenaea williamsonii*) (rare in Victoria)
- Lima Stringybark (*Eucalyptus alligatrix ssp.limaens)* (endangered in Victoria and vulnerable Nationally)
- Narrow Goodenia (*Goodenia macbarronii*) (Vulnerable Nationally, listed FFG)
- Strawberry Buttercup *(Ranunculus collinus)* (rare in Victoria)
- Mountain Swainson pea *(Swainsona recta)* (endangered in Victoria, listed FFG)

Narrow Goodenia
Photo: John Eichler

Mountain Swainson pea Photo: Paul Gullan

2.3.2 Fauna:

There are 311 fauna species recorded for the Samaria Zone, 38 of these are threatened (Viridians 2005) (refer to Appendix 5 for species, their threatened status and relevant acts) (Anderson et al 2003).
183 bird species have been recorded in the zone, and of these 23 are considered threatened at the State level. Of particular importance in the zone is the provision of habitat for Bush Stone-curlew, nectar resources for Swift Parrots, and roadside habitat for Grey-crowned Babblers.
Examples of threatened woodland species recorded in the Samaria Landscape Zone include:

- Bush-stone Curlew (*Burhinus grallarius*) (endangered in Victoria, listed under *FFG Act 1988*),
- Grey-crowned Babbler (*Pomatostomus temporalis*) (endangered in Victoria, listed under *FFG Act 1988*), and
- Swift Parrot (*Lathamus discolor*) (endangered in Victoria and nationally, listed under *FFG Act 1988*),
- Regent Honeyeater *(Xanthomyza phrygia)* (critically endangered in Victoria, Endangered Nationally, listed under *FFG Act*)

Examples of threatened species recorded within the Samaria Landscape Zone, predominantly associated with wetlands and waterways include:

- Macquarie Perch (Macquarie australasica)
- Mountain Galaxias (Galaxias olidus)
- Murray Cod (Maccullochella peelii peelii)
- Murray Spiny Cray (Euastacus armatus)
- Trout Cod (Maccullochella macquariensis)
- White-bellied Sea-Eagle (Haliaeetus leucogaster)
- Growling Grass Frog (Litoria raniformis)

Growling Grass Frog Photo: Viridans

Bush Stone-curlew Photo: Viridans

3.0 PREPARING A CONSERVATION PLAN

3.1 METHODOLOGY

The methodology used to develop this Conservation Plan is based on the 'Goulburn Broken Biodiversity Action Planning Developer's Manual' (GBCMA *in prep.*). This document provides the background information relating to BAP in the Goulburn Broken Catchment, and is designed to ensure consistency during the development of the plans.

The methodology used to prepare this plan contained eight main elements. These were,
1) Identification of Conservation Features and Threatened Species,
2) Ground-truthing of Potential BAP sites,
3) Field Surveying of BAP sites,
4) Prioritisation of BAP sites,
5) Generation of Focal Species List,
6) Generation of Key Biodiversity Asset List,
7) Development of Actions for Key Biodiversity Assets, and
8) Landscape Context Analysis.

Step 1. Identification of Conservation Features and Threatened Species
Features in the landscape that are of potential priority for conservation were identified, as well as flora and fauna species of conservation significance (eg. threatened under State or Commonwealth legislation). This involved desktop analysis of data (eg. literature review; spatial data (eg EVC, trees cover, wetlands, flora and fauna records (post 1980), aerial photographs); corporate databases (eg. Biosites, Victorian Fauna Display and Flora Information Systems); local knowledge investigations; and the Landscape Context Model (refer to Step 8). From this analysis, a series of sites likely to have conservation values and threatened species, were identified and mapped using GIS (CGDL 2005).

Step 2. Ground-Truthing of Potential BAP Sites
Involved surveying the Zone from the roadside, to compare desktop analysis data (Step 1) to the actual on-ground area, in regards to presence/absence, type of vegetation and raw condition.

Step 3. Field Surveying of BAP Sites
Sites were prioritised for survey as per the 'Goulburn Broken Biodiversity Action Planning Developer's Manual' (GBCMA *in prep.*). This prioritisation method is shown in Appendix 6. A number of sites requiring ground-truthing were field surveyed (on-site or from the nearest public land). This involved:
3.1) Bird Surveys: Undertaken in accordance with the Birds of Australia – Atlas Search Methods (1-2-hectares, twenty minutes) (Birds Australia 2001).
3.2) Vegetation Quality Assessment (VQA)(DSE 2004): Site-based habitat and landscape components were assessed against a pre-determined 'benchmark' relevant to the vegetation type being assessed (eg. grasslands, wetlands, plains grassy woodlands) (Refer to Appendix 7 for form).
3.3) Threat Identification: Whilst undertaking the Vegetation Quality Assessment (DSE 2004), a list of threatening processes (eg. pest plants and animals) at the priority sites, were recorded.

Step 4. Prioritisation of BAP Sites
These sites were given a ranked value of very high (VH), high (H), medium (M) or low (L), based on a range of factors (eg. conservation status of the EVC, presence of threatened species, size, VQA score). Sites not surveyed, nor automatically ranked (as per Appendix 6), were given a ranked value to the lesser of the available options (until surveying occurs).

Step 5. Generation of Focal Species List

The focal species approach (Lambeck 1997) uses the habitat requirements of a particular species, or group of species, to define the attributes that must be present in a landscape for these species to persist. For example, if a species that requires the largest remnant size is selected, then fulfilling the needs of that species may result in the conservation of all species, with smaller remnant size requirements. The factors used in this plan to select focal species were, remnant size and isolation distance (GBCMA *in prep.*).

Step 6. Generation of Key Biodiversity Asset List

The identified environmental features, including flora and fauna species, were categorised in to a series of 'nested' environmental assets. For example; similar species or environmental features may be located in 'nested assets' such as; creeklines, wetlands or ecological vegetation classes.

Step 7. Development of Actions for Key Biodiversity Assets

This step involved the development of a list of actions aimed at protecting and enhancing the biodiversity values in the Zone, by reducing the identified threats for each key biodiversity asset (as determine in Step 6). Available information (eg. Actions for Biodiversity Conservation (ABC) database) (DSE 2005a) and the Mid Goulburn Landscape Plan (Anderson et al 2003) were also used to compile the actions.

Step 8. Landscape Context Analysis

To achieve long-term viability of the priority 'BAP' sites, they need to be linked and/or increased in size and total tree cover, to form a viable functioning landscape. The Landscape Context Model (LCM) (Ferwerda 2003) uses a model of "known habitat" (based on mapping for tree cover, wetland, and major watercourses) to identify large remnants, key remnant clusters and the key linkages between them. However, because of potential limitations of the input data, areas of conservation significance (particularly grasslands and sparse woodlands) may not be identified. Similarly, areas with minimal conservation significance may be included, because habitat quality data is not included in the model.

However, the Landscape Context Model is useful as a background to BAP mapping, as it identifies areas that have the highest (or least) probability of containing additional sites, of conservation interest (as per Step 1). Therefore the model can be used to identify the areas of the landscape, that should be used to link and strengthen a network of conservation sites, and create a sustainable landscape. The model can also be used to further determine the major linkages between BAP sites. The Landscape Context Model is shown in Appendix 8.

4.0 IDENTIFYING PRIORITY SITES

In the Samaria Landscape 67 zone sites have been identified as Biodiversity Action Planning (BAP) priority sites, for conservation management. These sites are termed BAP sites. They contain remnant vegetation and vary greatly from a stand of paddock trees, to large forested areas such as the Samaria State Park. A number of these BAP sites have been ground-truthed and surveyed In order to identify the BAP sites, each site was assigned a number that identifies its location and the associated data. This unique number has been calculated using the map-index (map reference) number (1:25,000 map) and a site number (eg. 812433-5). An example of the site identification numbering system (eg. how the site(s) are identified, using the site number system) is illustrated below (Figure 4). An example of the data that is contained in the database (referred to as attribute table), for each BAP site is detailed below (Figure 5).

The location of the 67 BAP sites (in map form) is available, in hard copy (overview map) and electronic form (CD - specific maps) in Appendix 10. Appendix 10 also provides; an Attribute Table identifying information relating to each site (eg. site number, asset type, conservation status, EVC and focal species), a bird list, definitions list and an assets map.

Figure 4 – An example of the site numbering

Site Number:	812433-5
Biodiversity Asset 1	Dry Slopes and Ridges (Section 6.2)
Biodiversity Asset 2	Powerful Owl
Hectare	241
Bioregion	Central Victorian Uplands
Site Priority	Very High
EVC	22,47 (Section 2.2)
EVC Conservation Status	D (Depleted)
Focal Species 1	Speckled Warbler (Section 6.1)
Landholder	Various
Threats	230 (Pest Plants),

Figure 5 – An example of the data contained in the database (attribute table)

5.0. SUMMARY OF SITE SURVEYING

5.1. VEGETATION QUALITY ASSESSMENTS

A number of BAP sites were assessed based on habitat features of, 1) Large trees, 2) Canopy Cover, 3) Understorey, 4) Weediness, 5) Recruitment, 6) Organic Litter, 7) Logs (and Landscape Component Scores of), 8) Size, 9) Neighbourhood and 10) Core Area. They were scored out of a maximum score of 20 (assumed intact habitat). An example of the assessment sheet is provided in Appendix 7. It is hoped that extension staff will be able to complete more assessments in the future.

5.2 BIRD SURVEYS

Limited sites of the 67 priority BAP sites had bird surveys completed. A list will be developed as additional onground assessments are undertaken.

5.3 CONSERVATION THREATS

Whilst undertaking surveys (DSE 2004), a list of threatening processes (e.g. pest plants and animals) at the priority sites, were recorded according to the Actions for Biodiversity Conservation (ABC) database (DSE 2005a). These included:

- Vegetation Clearance (Land Clearance – removal of native vegetation),
- Habitat Fragmentation/Edge Effects (includes 'Adjacent Land Use Practices'),
- Waterways (instream barriers) (Changes in hydrological regimes e.g. wetlands),
- Animals – Domestic Stock (Inappropriate grazing management (e.g. timing, stocking rate),
- Firewood Collection & Cleaning Up (Removal of Habitat)
- Animals – e.g. Pest Species - Foxes and Rabbits,
- Invasion by Environmental Weeds (Pest Plants),
- Recreational Activities – motorised (Transport and Recreation), and
- Removal of Rocks/Soil (Impacts of Roadworks on Roadside Vegetation).

Vegetation/Land clearance (a key threatening process under the EPBC Act 1999) (Wierzbowski et al 2002) particularly occurred in the past, however it continues to be a threat to conservation values within the Zone. Practices such as inappropriate earth works (e.g. removal of natural depressions/wetlands, removal of native vegetation cover) and illegal tree removal, is a threat to biodiversity values.

Habitat fragmentation (a potentially threatening process for fauna in Victoria under the FFG Act 1988 (Wierzbowski et al 2002)) is primarily the result of historical land clearance. A range of species such as the Swift Parrot (*Lathamus discolor*), and Grey-crowned Babbler (*Pomatostomus temporalis*) are detrimentally affected by habitat fragmentation. It affects their ability to source food and suitable habitat required for their survival (e.g. leads to less effective immigration, emigration and breeding success). Habitat fragmentation also favours species such as Noisy Miners (*Manorina melanocephala*) (Bennett 1993). Elevated competition from these aggressive species (although native to Australia) threatens species diversity, by the exclusion of less aggressive species (e.g. Grey-crowned Babblers) from remnants.

Adjacent land use practices[6] (e.g. intensive irrigation and inappropriate earthworks, can also lead to the colonisation of fragmented remnant areas by weeds, waterlogging of vegetation, high watertable depths, nutrient run-off and an increase in sediment input to rivers and streams (DPI 2005).

[6] The term inappropriate (in this sense) refers to the purposeful movement of soil/vegetation without considering the natural landscape (e.g. water flow).

Changes in hydrology (e.g. hydrological regimes) threaten biodiversity values, particularly for wetlands, which have evolved to function with the natural cycles of flood and drought. Alteration to natural flow regimes of rivers and streams, is listed as a threat to Victorian waterways under the FFG Act 1988 (Wierzbowski et al 2002). A change in water regimes (including temperature and water quality) can dramatically alter system appearance and functioning, disrupt natural productivity cycles and cause changes in vegetation and habitat. This in turn affects the fauna that relies on wetlands (eg. for resources and breeding). However, environmental water allocations (EWA) are a process for providing appropriate hydrological regimes to wetlands with natural cycle interruptions (Howell 2002).

Inappropriate grazing management[7] affects biodiversity conservation through soil compaction; removal of vegetation; changed nutrient levels in and around native vegetation; tree dieback and results in competition for fodder by native animals, which require tussocky grass for shelter (Wilson & Lowe 2002). A number of the surveyed sites had a diverse range of understorey. However a number sites surveyed, were heavily grazed, often resulting in minimal shrub or ground cover. A number of isolated trees in paddocks, are stressed and showing sign's of dieback (e.g. dead limbs and loss of trunk bark). It is important to retain these trees as habitat for a range of species (e.g. birds, bats, reptiles and insects).

The removal of fallen timber (or 'cleaning up') was evident along roadsides and within private remnants. Removal of fallen timber can result in a loss of habitat for birds; mammals, reptiles and insects, exposing them to predation by introduced predators. With a reduction in insect populations, timber removal also reduces the number of insect-eating birds in an area. For example, the Bushstone Curlew (*Burhinus grallarius*) is just one of the species that is severely impacted upon by timber removal, due to loss of insects and the loss of fallen timber that is used as habitat and camouflage for the protection of chicks (DSE 2005a).

Firewood collection in remnant vegetation
Photo: R Heard

Pest Animals are a threat to conservation values of the area. Predation of native wildlife by the Cat (*Felis catus*) and by the introduced Red Fox (*Vulpes vulpes*) are listed as potentially threatening processes under the FFG Act 1988 (Wierzbowski et al 2002), due to their impact on native species. The European Rabbit (*Oryctolagus cuniculus*) and European Hares (*Lepus europaeus*) compete for habitat, remove native vegetation and disturb soil structure. Macropod grazing is also emerging as an issue in areas of remnant vegetation to have an interface with agricultural land.

Pest Plants (Weeds) are a major threat to biodiversity because they compete with native species, for essentials (e.g. space, light and nutrients). Invasion of native vegetation by environmental weeds is listed as a potentially threatening process under the FFG Act 1988 (Wierzbowski et al 2002). Examples of weeds evident in the Zone include; Paterson's Curse (*Echium plantagineum*), Horehound (*Marrubium vulgare*), Sweet Briar (*Rosa rubiginosa*), Peppercorns (*Schinus molle*), St John's Wort (*Hypericum perforatum*), Arrowhead (*Sagittaria graminea*), Bridal Creeper (*Asparagus asparagoides*) and Willows (*Salix* spp). Weeds are especially evident on roadsides due to escaped garden/agricultural plants, machinery disturbance (e.g. roadworks) and poor vehicle hygiene. Pest

[7] The term inappropriate (in this sense) refers to grazing native vegetation without consideration of stock capacity, time of year or length of time.

plants invading remnants can also be a result of adjacent land practices (e.g. agricultural weeds) and animal movement (e.g. birds).

Transport and Recreational Pursuits (e.g. motorised activities) can also lead to increased weeds and loss of native vegetation). Removal of Rocks and Soil was evident along roadsides, where graders had caused impact on native vegetation.

5.4 SITE PRIORITISATION

As illustrated (Figure 6), the 67 BAP sites have been given a priority status (ranked value) of very high (VH), high (H), medium (M) or low (L), based on a range of factors (conservation status of the EVC, presence of threatened species, size, VQA score). This prioritisation occurred at 3 stages; prior to surveying; following surveying and for unsurveyed sites. For example, prior to surveying, large sites with high EVC conservation status and threatened species, that did not require ground-truthing, were automatically given a priority status of very high (VH). Following surveying (refer to 5.1, 5.2 & 5.3), the surveyed sites were given a priority status based on the three factors above and the VQA score (Appendix 7). Unsurveyed sites that required ground-truthing, but were not able to be surveyed, nor able to be automatically ranked as Very High prior to surveying, were given a ranked value to the lesser of the available ranking's (until surveying can be conducted). Further information on the method used to prioritise the sites is identified in Appendix 6.

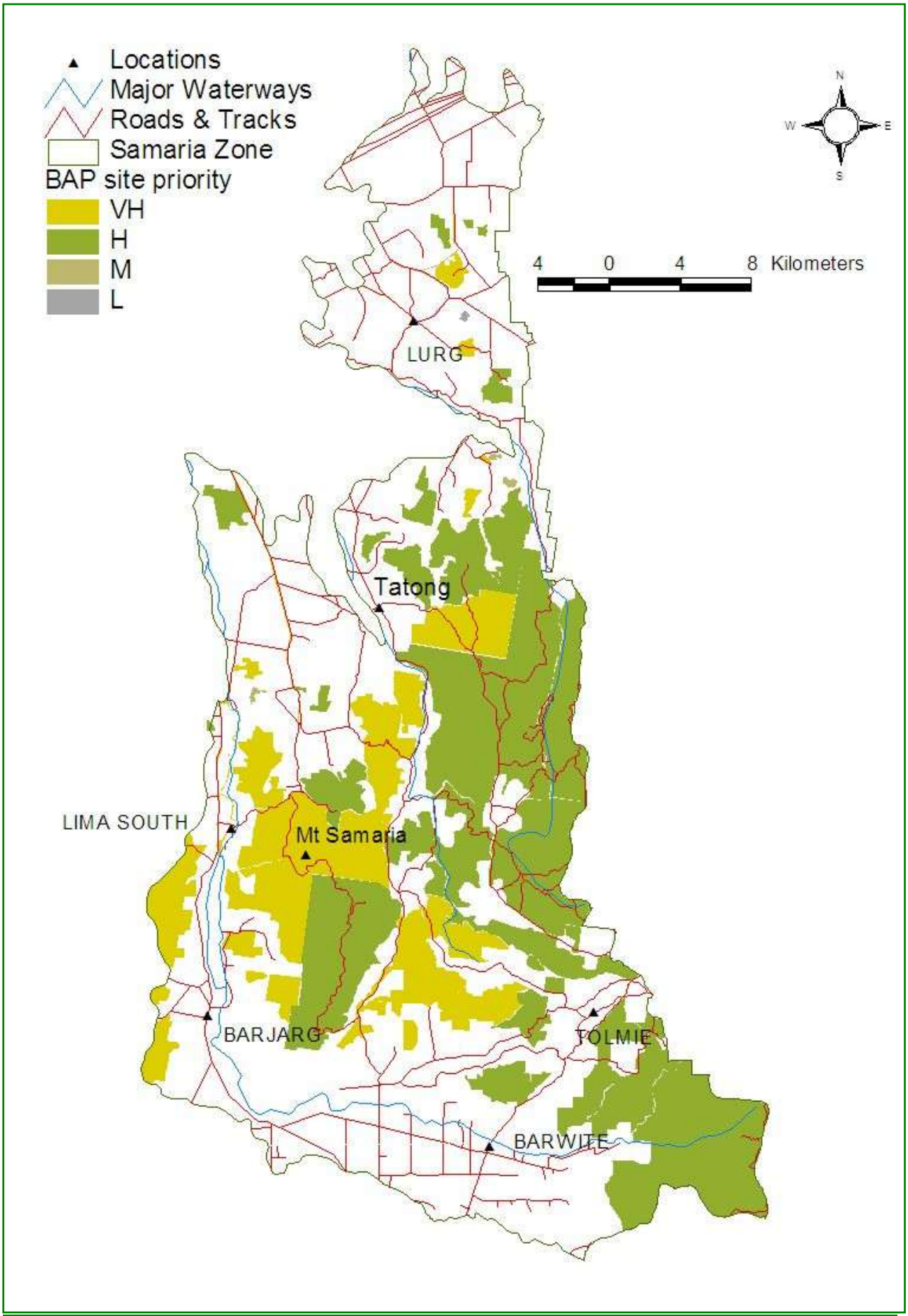

Figure 6 – Priority rating of BAP sites

6.0 BIODIVERSITY ASSETS

6.1 FOCAL SPECIES

Research shows that different species have different types of responses to landscape change. The focal species approach therefore uses the habitat requirements of a particular species or group of species, to define the attributes that must be present in a landscape, for these species to persist. Broadly, the focal species are predicted to be the most sensitive species (in a given landscape) to a threat or ecological process. Such that, their conservation should also conserve other less-sensitive species found in the same vegetation type. Therefore, focal species are a way of defining and guiding targets (eg. patch size and connectivity) for our landscape restoration strategies (Lambeck 1997).

Additional benefits of a focal species approach are that it allows for the monitoring of actions (eg. can undertake regular surveys to establish if focal species are becoming more common and using new sites). It also provides the community and organisations implementing on-ground works, with an 'iconic/focal' species (if they don't already have one), in order to increase enthusiasm for implementing works.

The six focal species identified in the Samaria Zone, and their ecological requirements (thresholds[9]) are identified below (Table 2). A definition of the ecological terms used include:

- Minimum patch size (patch size threshold) – refers to the minimum patch size of vegetation required for the species to maintain viable populations,
- Critical distance between habitat patches (isolation threshold) – refers to the size of the gap between habitats, beyond which, on a daily basis, the animal doesn't generally cross (GBCMA in prep.)
- Dispersal threshold – refers to the distance (km) for which the species has been known to travel (e.g. for breeding, migration), but generally does not on a daily basis,
- Ecological Vegetation Class (EVC) – the vegetation community that the species prefers, and
- Other requirements – identifies some other known requirements (not comprehensive) for the species to survive, or to inhabit an area.

An example of a focal species project already occurring in the northern area of the Samaria Zone, is the Regent Honeyeater (*Xanthomyza phrygia*) project. Every year strategic plantings are carried out in order to connect a network of woodland remnants, which will allow Regent Honeyeater to access more food and thereby increase breeding success. The newly connected remnants can then provide habitat for the expanding populations of other species that will benefit from the increased connectivity such as squirrel gliders and bushland birds.

It is envisaged that community groups and agencies may target one, or a combination of, the focal species identified (Table 2), for planning and implementation of on-ground works in the Zone. The focal species are only a suggestion of species to focus on-ground works. Other species may also be the focus for on-ground works, given new information and community desire to implement works for another species. Keeping in mind that if we aim to cater for these species, we are also assisting a suite of species and working towards overall vegetation cover targets for the catchment.

[9] Thresholds refer to the point at which relatively rapid change occurs (eg loss of species). Therefore, these should be used as a minimum target only.

Table 2: Focal Species and their Habitat Requirements –Samaria Zone

	**Speckled Warbler *(Chthonicola sagittata)***	
	Minimum patch size (threshold)	>10ha Not roadsides.
	Critical distance between patches	<500m
	Dispersal threshold	<2km
	Ecological Vegetation Class	Dry Forest, Grassy Woodland
	Some other requirements (general)	
	**Regent Honeyeater (*Xanthomyza phrygia*)**	
	Minimum patch size (threshold)	>5ha. Continuous roadside vegetation >1km in length
	Critical distance between patches	none
	Dispersal threshold	5km
	Ecological Vegetation Class	Box-ironbark forest, Woodlands
	Some other requirements (general)	Highly mobile, so will follow nectar
	**Powerful Owl (*Ninox strenua*)**	
	Minimum patch size (threshold)	500ha. 1000ha Box-ironbark forest
	Critical distance between patches	none
	Dispersal threshold	20km
	Ecological Vegetation Class	Damp and Dry Forest
	Some other requirements (general)	Hollows, Prey abundance, Old growth
	**Grey-crowned Babbler (*Pomatostomus temporalis*)**	
	Minimum patch size (threshold)	>2ha, >1km of continuous roadside
	Critical distance between patches	<500m form known site
	Dispersal threshold	<2km, very few records >10km
	Ecological Vegetation Class	Grassy Woodland
	Some other requirements (general)	Mature trees, shrubs, corridors
	**Bush-stone Curlew (*Burhinus grallarius*)**	
	Minimum patch size (threshold)	>1ha, >40m wide
	Critical distance between patches	<1km
	Dispersal threshold	<2km from known site
	Ecological Vegetation Class	Creeklines, Woodlands
	Some other requirements (general)	Fallen logs, Fox control
	**River Blackfish (*Gadopsis marmoratus)***	
	Minimum patch size (threshold)	same reach
	Critical distance between patches	same reach
	Dispersal threshold	same reach
	Ecological Vegetation Class	Waterways
	Some other requirements (general)	Requires clear flowing streams with plentiful rocks and logs under which it shelters and feeds. Carp management

Habitat Requirement Source: Variety of Sources (GBCMA in prep.)
Photo Credits (NRE 2002d): Bush-stone Curlew (Ian McCann), Grey-crowned Babbler (Eileen Collins), Other (Viridans 2005)

6.2 KEY BIODIVERSITY ASSETS

Biodiversity Action Planning (BAP) attempts to take a strategic approach toward the conservation of threatened and declining species and vegetation types, by looking for opportunities to conserve groups of species, in appropriate ecosystems. The identification of the appropriate biodiversity assets to focus conservation effort is the most critical part of the BAP process. This approach has been used to group together species that use the same type of habitat. By protecting these assets, habitat for a suite of threatened species associated with that habitat can be conserved (e.g. by choosing 'Riparian Systems' as a key biodiversity asset, it incorporates all of the species that live in, and use a Riparian System, as well as the individual threatened species). Another benefit of this approach is that specific actions (Section 7.0), based on the requirements of each asset (e.g. to counter threats and improve the status of the asset), can be developed. Planning and implementation of on-ground works and actions that specifically target each of these assets, can then be undertaken (GBCMA in prep.).

The 67 BAP sites in the Samaria Zone have been categorised according to six key biodiversity assets: Riparian Systems, Box Ironbark, Dry Slopes and Ridges, Valley Grassy Forest and Herb-rich Foothill Forest. For further information on each asset, along with threatened species examples, refer to Table 3.

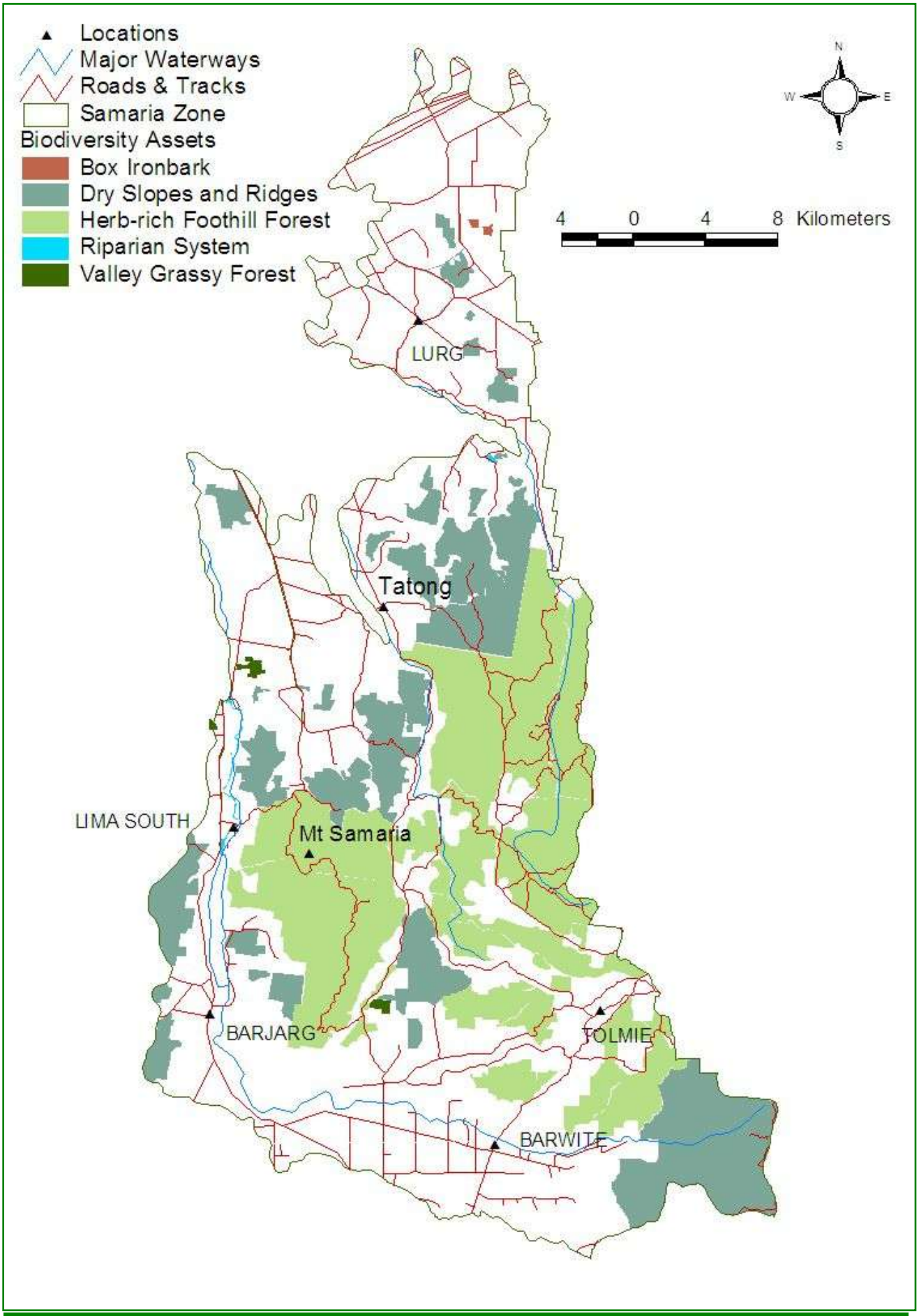

Figure 7 – Location of Key Biodiversity Assets – Samaria Landscape Zone

Table 3: Key Biodiversity Assets – Samaria Zone

Key Biodiversity Assets	Examples of significant species
1) Riparian Systems In the Samaria zone major systems include the Broken River, Ryan and Holland Creeks. Associated EVCs include Creekline Grassy Woodland and Riparian Forest.	**Fauna**: River Blackfish, Trout Cod, Mountain Galaxias, Blue-billed Duck, Nankeen Night Heron, **Flora:** Flat Spike-sedge, Highland Bush-pea
2) Box-Ironbark Box Ironbark Forest have been dramatically reduced to 1.3% of its former distribution. Small fragments can be found in the northern end of the zone.	**Fauna:** Brush-tailed phascogale, Squirrel Glider, Grey-crowned Babbler, Regent Honeyeater **Flora:** Buloke, Purple Diuris (*Diuris punctata*), Orchids (*Caladenia spp*)
3) Dry Slopes and Ridges This biodiversity asset is associated with well drained poorer soils and includes the EVCs Grassy Dry Forest , Heathy Dry Forest , Shrubby Dry Forest and Granitic Hills Woodland.	**Fauna:** Speckled Warbler, Powerful Owl, Turquoise Parrot **Flora:** Blue-leaf Tussock-grass, Velvet Apple-berry, Mount Samaria Guinea-flower
4) Valley Grassy Forest Occurs in fertile soils often adjacent to cleared land. It has a relatively high weed composition.	**Fauna:** Powerful Owl, Hooded Robin, Diamond Firetail **Flora:** Rough Twig-sedge, Slender Tick-trefoil, Narrow goodenia
5) Herb-rich Foothill Forest Herb-rich Foothill Forest is the dominant EVC in this zone and retains 76% of its former distribution. It has associations with many significant flora and fauna species.	**Fauna:** Powerful Owl, Eastern horseshoe Bat, Spot-tailed Quoll **Flora:** Tiny Daisy, Highland Bush Pea, Stalked guinea flower.

* The numbering of the Key Biodiversity Assets (1-5) is only intended to assist with the identification of the assets throughout the remainder of the report.

7.0 PRIORITY ACTIONS - KEY BIODIVERSITY ASSETS

Priority actions for the Samaria Landscape Zone have been developed and grouped based on each 'Key Biodiversity Asset' . Priority actions for the key biodiversity assets were developed based on the following factors, (1) size/extent (2) condition and (3) landscape processes (eg. habitat connectivity, hydrological regimes). The condition (2) section was also further split in relation to; education/extension; on-ground works; threatened species; and pest plants and animals. For example; an action relating to the condition of a remnant, due to rabbits, can be found under; 'condition' – 'pest plants and animals'.

For each of the five key biodiversity assets (1-5), the following pages identify:
A) An introduction to the asset in the Samaria Landscape Zone,
B) Photographic example of the asset in 'good condition' for the zone, and
C) Proposed actions for each of the assets in the Zone (broader actions in Anderson et al 2003).

It is proposed that the community and agencies in the Samaria Zone investigate options for implementing these actions in to existing projects/policies. For example, BAP sites (refer to Appendix 10) in each asset type, should be targeted in order of priority (Very High, High, Medium to Low) in relation to these actions (where applicable). This forms the basis of BAP, where the very high value sites, that require less cost for long-term protection, will provide the highest prospect for conservation (GBCMA *in prep*.).

Note: The Flora and Fauna Guarantee Act 1988 provides for the listing of Victoria's threatened plant and animal species, ecological communities and potentially threatening processes. Under the Act, an Action Statement must be prepared. Action Statements outline what is required for the species conservation. They are developed based on a rigorous legislative process (Acts of Parliament) and are therefore of high priority. For further information refer to the 'Actions for Biodiversity Conservation Database' (ABC) (DSE 2005a).

7.1) KEY BIODIVERSITY ASSET – Riparian Systems

1A) Introduction –Riparian Systems:

Riparian systems are an important biodiversity asset within the Samaria zone. They provide habitat for a range of fauna species and provide refuge areas during time of drought. These systems also provide connectivity through the landscape for mobile fauna especially in the valleys and on the plains in the northern section of the Samaria Zone where the landscape has been significantly disturbed due to agricultural activity. The Riparian Systems biodiversity asset is made up of the EVC group numbers 15,9 & 8 (See Table 1). They can be found on public and private land throughout the zone.

The Broken River, sections of Holland Creek and the Upper reaches of Ryan's Creek have been identified as Priority Waterways (GBCMA 2005). Spring Creek in the Northern Falls bioregion supports a number of riparian EVCs. Much of this area is now cleared and severely disturbed. Lake Nillahcootie is a major irrigation storage on the riverine plain of the Broken River. It provides habitat for a variety of waterbirds. Other significant water storages include Lake McCall-Say and Loombah Weir which are situated on Ryan Creek encompassed by Tatong State Forest. Stream frontages on private land have generally been degraded through agricultural activity and associated impacts including erosion, weed infestations, high nutrient runoff and native vegetation clearance.

1B) Photographic Example – Riparian Systems:

Riparian System – Broken River – BAP Site No 812434-6 Photo: Rowhan Marshall

C) Actions Proposed –: Riparian Systems

Size/Extent:

- **Create buffers** to protect riparian systems from degrading processes.
- **Increase connectivity** along riparian systems and enhance connectivity to other remnants.
- **Improve** the quality of existing systems.

Condition:

Education/Extension

- Use BAP mapping to assist in developing a **strategic approach** to protecting and enhancing ecological processes in the landscape.
- **Consult** with licensees of waterways, to fence these areas through waterway incentives.
- **Promote** the benefits of protecting and enhancing native vegetation in the in-stream and riparian environments and linking to private remnants, in extension and voluntary programs.
- **Encourage** retention of in-streams vegetation and snags and re-snag where appropriate.
- Use **focal species** to generate interest in riparian systems.
- Promote **Whole Farm Plan** on private land through DPI.
- In **consultation** with Goulburn Broken CMA, develop habitat management plans for streamsides on freehold, with particular emphasis upon protecting and expanding priority areas.

On-ground Works

- **Protect** high priority sites (GBCMA 2005), through covenants, incentives and liaising with other agencies.
- **Establish** exclusion fencing and off stream watering points for all affected sites on waterways.
- **Encourage** retention of fallen timber on and in all waterways and adjoining remnants.
- **Control** weed infestations and feral animals
- **Improve** instream habitat through re-snagging and revegetation.
- **Manage** impacts of recreational activities including fishing, access and firewood collection.
- Reduce **nutrient runoff** into systems through streamside buffers.

Threatened Species

- **Undertake** instream works to enhance habitat for threatened fish species and reduce impacts by exotic species such as carp. Remove barriers to native fish migration.
- **Provide** linkages and habitat to support threatened fauna species including associated with riparian systems Brush-tailed Phascogale, Squirrel Glider and Bush Stone–curlew.

Pest Plant and Animals

- Continue ongoing **control of foxes and feral cats**.
- Control regionally listed **weeds** and environmental weeds from sites.

Landscape Processes (ie. hydrological regime, habitat connectivity):

- **Identify and prioritise potential** sites for habitat expansion and improved connectivity as identified by the landscape context model and maps provided in this document.

7.2) KEY BIODIVERSITY ASSETS – Box Ironbark

A) Introduction – Box Ironbark:

Box Ironbark Forests are open forests that occur on low hills at altitudes between 150-230m, with an annual rainfall between 500-650mm. The skeletal soils are often gravelly, and are of low fertility with a poor moisture holding capacity. The overstorey is dominated by Red Box, Red Stringybark (Eucalyptus macrorhyncha), Red Ironbark (E. tricarpa) and Cherry Ballart. The understorey is a scattered shrub layer which includes Golden Wattle, Daphne Heath (Brachyloma daphnoides), Grey Everlasting (Ozothamnus obcordatus) and Sweet Bursaria (Bursaria spinosa). The sparse ground layer includes Wallaby Grasses, Spear Grasses, Red Anther Wallaby Grass (Joycea pallida), Black Anther Flax Lily (Dianella revoluta), Shiny Everlasting (Bracteantha viscosa) and Chocolate lily.

In the Samaria landscape zone Box Ironbark Forest has been significantly reduced (Table 1) to three remnant sites in the Lurg area.

Over 60% of the Box Ironbark Forest in the Goulburn Broken Catchment has been lost since European settlement. Of the 40% that remains, most have been disturbed. Many of the plants and animals that relied on this habitat are also threatened. The main threats include: inappropriate grazing regimes, isolation, lack of understorey and ground layer, lack of natural regeneration, weed invasion, pest animals and loss of old trees and deadfall.

B) Photographic Example – Box Ironbark:

Photo: Box Ironbark – A Key Biodiversity Asset in the Samaria Zone Photo: Rowhan Marshall

C) Actions – Box Ironbark:

Size/Extent:

- **Encourage landholders to increase the size and quality** of existing remnants through stock exclusion, buffering edges and linkages.
- **Protect** significant roadside ie Emblings Rd.

Condition:

Extension/Education

- Use BAP mapping to assist in developing a **strategic approach** to protecting and enhancing ecological processes in the landscape.
- **Organise community education activities** relating to the importance of Box Ironbark Forests and associated flora and fauna species, specifically targeting high priority remnants.
- Further **promote** the benefits of protecting and enhancing remnant patches through extension and voluntary programs, such as Environmental Management Incentives, Land for Wildlife and Trust for Nature.
- Promote **Whole Farm Plan** on private land through DPI.
- Focus works to **complement** existing programs such as the Regent Honeyeater project.
- **Encourage** retention of fallen timber in privately owned Box Ironbark Forest sites.
- **Liaise** with shire to ensure roadsides are protected.

On-ground Works

- **Maintain and improve condition** of all identified high value sites by encouraging the retention of fallen timber and hollow bearing trees, and manage regionally listed weeds.
- **Protect** clusters or individual specimens of large, hollow-bearing trees are retained and protected throughout the zone.
- Promote **appropriate** ecological burning regimes to create ideal age class structure (fire intervals 5-50years, DSE 2002)
- **Exclude all grazing** to allow trees, shrubs and native ground cover regenerate.
- **Leave any dead standing trees**. Install nest boxes where natural hollows are in short supply to increase the number of nesting hollows for animals such as Brush-tailed Phascogales and Squirrel Glider.
- **Control** of noisy miners through eradication programs and supplementary understorey planting.
- **Restore structural diversity** by supplementary planting degraded remnants with indigenous shrubs and ground cover, if regeneration has not occurred following fencing (eg. no existing seed source).

Threatened Species

- Create linkages through the landscape to support threatened species dispersal
- Promote retention of tree hollows and placement of nest boxes to support threatened species habitat.

Pest Plant and Animals

- **Minimise disturbance** at high value sites to prevent erosion and minimise weed invasion.
- **Reduce** all herbivore (including Macropod) populations in and around Box Ironbark remnants to allow for the regeneration of native understorey and ground cover species.
- **Continue ongoing contro**l of foxes and feral cats for the protection of threatened species and focal species including Regent Honeyeater and Grey Crowned Babbler.

Landscape Processes (eg. hydrological regime, habitat connectivity):

- **Identify and prioritise potential sites** for habitat expansion and improved connectivity as identified by the landscape context model and maps provided in this document.

7.3) KEY BIODIVERSITY ASSET – Dry Slopes and Ridges

A) Introduction – Dry Slopes and Ridges:

This biodiversity asset incorporates a variety of EVCs including; Shrubby Dry Forest, Heathy Dry Forest, Grassy Dry Forest and Granitic Hills Woodland. Generally associated with drier north facing aspects this asset can be found at a variety of locations throughout the zone.
Examples of this biodiversity asset can be found on Tiger Hill road at the start of the State Forest, Samaria Road at the northern end of the State Park and along Granite road near Lurg. The majority of this relatively undisturbed asset is contained within Strathbogie State Forest, Toombullup State Forest and Samaria State Park. One of the main impacts of this asset on public land is fire. In the north fragmented areas are contained mainly on private land.

B) Photographic Example – Dry Slopes and Ridges:

State Forest near Tatong- BAP No 812442-11 *Photo: Rowhan Marshall*

C) Actions – Dry Slopes and Ridges:

Size/Extent Related:

- **Liaise** with public and private land managers to increase the quality of existing sites.
- **Promote** landscape linkages using existing remnants.
- Promote **cross tenure** management for sites containing public and private land.

Condition Related:

Education/Extension:

- Use BAP mapping to assist in developing a **strategic approach** to protecting and enhancing ecological processes in the landscape.
- **Encourage** the retention of logs, leaf litter and dead trees, as habitat for focal and threatened species.
- Promote **appropriate** ecological burning regimes to create ideal age class structure (fire intervals 10-50years, DSE 2002).
- Promote **Whole Farm Plan** on private land through DPI
- Promote focal species to generate works on private land.

On-ground Works:

- **Restore structural diversity** through natural regeneration and supplementary planting with indigenous shrubs and groundcover
- **Implement** North East Forest Management Plan recommendations and management prescriptions (NRE 2001)
- **Exclude** grazing to promote regeneration.
- Focus works to **complement** existing programs, such as the Regent Honeyeater project.
- **Promote** sites of high value for conservation covenant, Land for Wildlife and incentives

Threatened Species:

- **Exclude** regular burning at sites which contain threatened flora and fauna unless otherwise indicated.
- **Raise awareness** among Landowners of threatened species requirements.
- **Raise awareness** among public land managers of threatened species requirements and associated forest management zoning (SPZ Powerful Owl).

Pest Plants and Animals:

- **Undertake pest plant management** for regional priority weeds for all high priority sites and encourage stakeholders to coordinate the removal of weeds (eg. community working bees/Landcare groups).
- **Undertake pest animal management** (eg. Foxes, Cats and Rabbits) in areas adjoining all reserves for the benefit of threatened fauna such as Bush Stone Curlew, Ground Cuckoo-shrike, Squirrel Glider and Turquoise Parrot.

Landscape Processes (eg. habitat connectivity):

- **Identify and prioritise potential sites** for habitat expansion and improved connectivity as identified by the landscape context model and maps provided in this document.

7.4) KEY BIODIVERSITY ASSET – Valley Grassy Forest

A) Introduction – Valley Grassy Forest:

This biodiversity asset has been reduced to 7% of its former distribution. It has been cleared extensively for agricultural and has a relatively high weed composition facilitated by close proximity to agricultural land. Remnants are located to the north of Lake Nillacootie in the Broken River valley and to the SE of Samaria State Park. It occurs under moderate rainfall regimes on fertile well-drained soils on gently undulating slopes and valley floors. In season, a rich array of herbs, lilies, grasses and sedges dominate the ground layer.

In the Samaria Zone the sites are located on shire roadsides (Samaria Rd) and on private land.

B) Photographic Example – Valley Grassy Forest

Remnant corridor of Valley Grassy Forest along Samaria Rd – BAP No 812443-2
Photo: Rowhan Marshall

C) Actions – Valley Grassy Forest:

Size/Extent:

- **Encourage landholders to increase the size** of existing remnants, to establish new areas of indigenous species of trees and shrubs, and to retain or establish buffer zones with revegetation or fence out and allow regeneration.
- **Protect significant roadsides** such as Samaria Rd.

Condition:

Education/Extension:

- Use BAP mapping to assist in developing a **strategic approach** to protecting and enhancing ecological processes in the landscape.
- **Encourage** the retention of logs, leaf litter and dead trees, as habitat for focal and threatened species.
- Promote **appropriate** ecological burning regimes to create ideal age class structure (fire intervals 10-50years, DSE 2002).
- Promote **Whole Farm Plan** on private land through DPI
  Promote focal species to generate works on private and public managed land.

On-ground Works:

- **Restore structural diversity** through natural regeneration and supplementary planting with indigenous shrubs and groundcover
- **Exclude** grazing to promote regeneration.
- **Promote** sites of high value for conservation covenant, Land for Wildlife and incentives
- **Control** of noisy miners through eradication programs and supplementary understorey planting.

Threatened Species:

- **Exclude** regular burning at sites which contain threatened flora and fauna unless otherwise indicated.
- **Raise awareness** among Landowners of threatened species requirements.

Pest Plants and Animals:

- **Undertake pest plant management** for regional priority weeds for all high priority sites and encourage stakeholders to coordinate the removal of weeds (eg. community working bees/Landcare groups).
- **Undertake pest animal management** (eg. Foxes, Cats and Rabbits) in areas

Landscape Processes (eg. hydrological regime, habitat connectivity):

- **Identify and prioritise potential sites** for habitat expansion and improved connectivity as identified by the landscape context model and maps provided in this document.

7.5) KEY BIODIVERSITY ASSET – Herb-rich Foothill Forest

A) Introduction – Herb-rich Foothill Forest:

Occurs on relatively fertile, moderately well-drained soils on an extremely wide range of geological types and in areas of moderate to high rainfall. This biodiversity asset favours sheltered aspects mainly easterly and southerly aspects on lower slopes and gullies. A high cover and diversity of herbs and grasses in the ground layer characterise this biodiversity asset.

Significant areas of this asset were burnt by wildfire during the 2006/2007 summer. The majority of this asset is located on public land and managed as State Forest and State Park. Areas of this asset on private land generally adjoin public land and can be located in the Tatong Valley and around Samaria State Park.

Many species rely on these forest and ecological services that they provide. More than 36% of Herb-rich Foothill Forests in the Goulburn Broken Catchment have disappeared since European settlement. Of the remnant area, 21% occurs on private land. The support of private landholders is important for the ongoing conservation of this asset. Current threats include, inappropriate fire regimes, soil disturbance, weed invasion, pest animals, loss of tree and ground habitat and grazing pressures. The Samaria Zone has retained 76% of its previous extent, mainly managed as public land.

B) Photographic Example – Herb-rich Foothill Forest:

Herb-rich Foothill Forest, Shultz Track near Tatong. BAP No 812431-1. Photo: R Marshall

C) Actions – Herb-rich Foothills Forest:

Size/Extent:

- **Encourage landholders to increase the size** of existing remnants through supplementary planting and landscape linkages. Establish buffer zones with revegetation or fence out and allow regeneration.
- **Liaise** with public land managers to protect significant roadsides and enhance existing areas through minimising disturbances such as recreational use, inappropriate fire regimes and timber harvesting

Condition:

Extension/Education

- Use BAP mapping to assist in developing a **strategic approach** to protecting and enhancing ecological processes in the landscape.
- **Organise community education activities** relating to the importance of Herb-rich Foothill Forest and associated flora and fauna species, specifically targeting high priority remnant adjacent to public land.
- Promote **Whole Farm Plan** on private land through DPI
- Further **promote** the benefits of protecting and enhancing remnant patches through extension and voluntary programs, such as Environmental Management Incentives and Land for Wildlife.
- **Encourage** retention of fallen timber.
- Promote **appropriate** ecological burning regimes to create ideal age class structure (fire intervals 5-50years, DSE 2002).

On-ground Works

- **Implement** North East Forest Management Plan recommendations and management prescriptions (NRE 2001)
- Ensure the **application** of Code of Forestry Practices (DNRE 1996)
- **Maintain and improve condition** of all identified high value sites by encouraging the retention of fallen timber and hollow bearing trees, and manage regionally listed weeds.
- **Protect** clusters or individual specimens of large, hollow-bearing trees are retained and protected throughout the zone to enhance habitat for hollow dependant species such as Powerful Owl and Gliders.
- **Exclude grazing** in priority sites to promote natural regeneration.
- **Restore structural diversity** by supplementary planting in degraded remnants.

Pest Plant and Animals

- **Minimise disturbance** at high value sites to prevent erosion and minimise weed invasion.
- **Continue ongoing contro**l of foxes and feral cats for the protection of threatened species and focal species including Brush-tailed Phascogale, Sugar Gliders and Hooded Robins.

Landscape Processes (eg. hydrological regime, habitat connectivity):

- **Identify and prioritise potential sites** for habitat expansion and improved connectivity as identified by the landscape context model and maps provided in this document.

8.0 Monitoring

Monitoring is a fundamental component of all management activities and an important tool, which can be used to enhance the knowledge of biodiversity assets and manage for their on-going protection (Robinson *in prep*.).

The following table (Table 4) provides a basis for monitoring in the Samaria Landscape Zone. Where possible, this information will feed in to the various Goulburn Broken Catchment monitoring programs. It identifies a general monitoring outline, including actions that may be conducted to determine progress towards achieving catchment biodiversity targets. It identifies the key biodiversity asset, key indicators for monitoring and the suggested frequency/intensity of monitoring.

It is important to note that many of the monitoring activities listed below are already taking place, through a variety of mechanisms (eg. collection of data via local/catchment and Statewide databases and processes). Where existing mechanisms are already in place, they will continue to be used. However, there are other monitoring activities that are needed, to provide useful information and allow for accuracy assessment of the Catchments progress, towards meeting the Biodiversity Resource Condition Targets (RCT's).

A wide variety of monitoring actions are listed below. However this does not result in a binding commitment of those organisations (eg. time or funding), to undertake all of the monitoring. Rather, this table is intended to be a source of ideas for agency staff and community groups (eg. community groups may be interested in conducting future surveys). Interested persons can contact the Goulburn Broken Catchment Management Authority, Shepparton, or the Department of Primary Industries and Department of Sustainability and Environment Offices, Benalla, to discuss ideas and to ensure a coordinated approach (refer to Section 10.0 for contact information).

Whilst Table 4 outlines monitoring actions, evaluation of the BAP process also needs to occur, to evaluate the effectiveness of the BAP process (eg. in engaging people and prioritising works). An evaluation plan is therefore being developed to provide an overarching evaluation process for BAP in the Goulburn Broken Catchment.

Table 4: Monitoring - Samaria Zone

Key Biodiversity Asset	Key Indicators for Monitoring	Frequency/Intensity
1) Riparian Systems		
	• Trends in environmental flows and in-stream habitat condition (as measured by ISC)	Five yearly* ISC assessments
	• Trends in water quality	Once yearly as part of EPA monitoring: five yearly as part of ISC: at least 30 sites (GBCMA 2004b)
	• Monitor the trends in condition and functionality of riparian vegetation/stream frontages condition (resurveying of sites using VQA assessments; area/number fenced; area/number with restored flows)	Every 5 years, 30 sites: part of ISC; CAMS inputs
	• Surveying of mean habitat width of waterways in Zone	Every 5 years, all sites (or in accordance with existing waterways monitoring), aerial photography
2) Box-Ironbark		
	• Refer to "All Key Biodiversity Sites" below	See below
3) Dry Slopes and Ridges		
	• Refer to "All Key Biodiversity Sites" below	See below
4) Valley Grassy Forest		
	• Refer to "All Key Biodiversity Sites" below	See below
5) Herb-rich Foothill Forest		
	• Refer to "All Key Biodiversity Sites" below	See below
All Key Biodiversity Assets		
	• Trends in vegetation condition (resurvey sites using VQA assessments) (this includes threats data)	Every 5 years, riparian system – 20 sites; woodlands/forests – 30 sites
	• Trends in bird survey data (resurvey sites using bird survey method)	Every 5 years, riparian system – 20 sites; woodlands/forest – 30 sites
	• Establish photographic monitoring points at each survey site.	Every 5 years: when complete VQA and bird surveys

	• Vegetation Quality Assessments, bird surveys and photographic point surveys at the remaining unsurveyed BAP sites	Within next 5 years, to allow monitoring of these sites (as outlined above)
	• Inclusion and surveying of up to date data and information (if any changes), or addition of sites (eg. if not already an identified site)	Once yearly. Information to be fed into BAP database
	• Trends in Focal Species reporting/sightings (eg. population size, age distribution, frequency of records, number of birds/pairs recorded, habitat (eg number of sites/EVC), breeding success, recruitment)	Initial survey throughout zone to establish baseline data on population size and structure, subsequent two-yearly as part of bioregional program: across the zone
	• Monitoring of threatened species, against current records	Every 2 years: across the zone
	• Undertake surveys for all of listed (threatened) species to establish baseline data on abundance and distribution in accordance with VROTPop procedures	Within next 5 years: across the zone
	• Subsequent assessments of selected populations (as per above threatened populations) to determine population trends	Within next 5 years (subsequent to above action): across the zone
	• Trends in connectivity and characteristics of sites within landscape (eg. size of remnants)	Every 5 years; aerial photography
	• Overlay of on-ground works areas against this plans mapping data	Once yearly (end financial year), all applicable sites
	• Number of incentives processed and implemented for priority sites for all Key Biodiversity Assets (private land only)	Once yearly, in accordance with incentive mapping and overlaying of on-ground works areas (as per above action)

* Five yearly refers to five times per year

9.0 FURTHER INFORMATION - PRIORITY SITES

Priority Site Data:
Appendix 10 provides further information for the 67 priority BAP sites within the Samaria Landscape Zone. This information has been derived using the Geographical Information System - Arcview 3.3. It is intended that the priority site information and other information detailed in this plan, will allow groups and staff (eg. extension staff and community groups) to:

- Be pro-active in targeting sites,
- Act as a basis for informed management of the site,
- Provide a further rationale for applying incentives,
- Provide a tool for landholders and the wider community,
- Provide a tool to show how a site fits into the wider landscape, and
- Provide a benchmark against which future improvements in management can be monitored.

How To Use The Data Provided:
The data provided is intended for use by a range of agencies and community groups, to assist with biodiversity conservation in the Zone. It is particularly targeted towards agency extension officers. For example, it is anticipated that prior to, or following a site visit, an extension officer will investigate the data associated with a site, such as;

- What is the Ecological Vegetation Class of the site?
- How does the site fit in to the wider landscape?
- Are there any management agreements or incentives for the site (eg. covenant, bush tender)?
- Are there threatened or significant species recorded at the site or nearby?
- What is the rating of the site and those near it (eg. very high, high, medium or low)?
- What is the overarching management recommendation for the site (eg. protect or restore)?
- What are the actions recommended for the site? (eg. pest plant management) (Negotiations need to occur to get the best possible outcome for all involved)
- What are the options available to the landholders to fulfil these actions(eg. fencing incentive)?
- What are the options for joining the site to public land? (eg. widening roadsides to provide a corridor/link)?
- Using the Landscape Context Map (Appendix 8), determine where possible linkages (revegetation) may be of the most benefit – think about the landscape, what we could do to help the area.
- It is also important to remember that sites with scattered trees are still a vital link in the landscape and especially in an area where much of the original vegetation has given way to agriculture. Officers need to determine on site, where the best possible linkages could occur, and often this should include scattered vegetation, as although they generally have not been identified as a site in this plan, they form an important element for providing links between the identified sites.

Keeping The Data Current:
The data contained in this report is by no means 'comprehensive', as this process relies on the regular updating of information, to keep it accurate and timely. Therefore this plan is adaptive, to enable management actions and information to be modified, in response to further information, including monitoring. The plan will also be reviewed when necessary to ensure that it remains a 'living' document. In order for the data and associated maps to remain as up to date and relevant as possible, it is important that site data continue to be added to the database. For example, the Department is not always aware of sightings of flora and fauna by individual landholders or community groups and there are still a number of sites that require Vegetation Quality Assessments and Bird Surveys.

Further Information or To Provide Data:
For clarification of information or to provide further data, please contact the Water and Biodiversity Team, Department of Sustainability and Environment, Benalla on (03) 5761 1611.

10.0 LANDHOLDER ASSISTANCE

There is a range of assistance available for landholders in regards to planning for biodiversity conservation, and implementing works, on their properties. This section is designed to provide an overview of some of the property planning, management tools and incentives, available to landholders and the community within the Mid Goulburn Region. Also included are some of the programs within the community which will benefit from the information provided in this plan.

Environmental Incentives	WHOLE FARM PLANS
These financial incentives will provide funding for environmental works such as fencing off remnants and revegetation projects.	Protecting biodiversity on a farm is an important element when developing and implementing a Whole Farm Plan. Biodiversity Action Planning can inform the process and provide extra information for landholders and extension officers.

Advice and Information:
Please contact your local Department of Primary Industries (DPI)/Department of Sustainability and Environment (DSE) Office, the Goulburn Broken Catchment Management Authority (GBCMA), the Goulburn Murray Landcare Network (GMLN) or Trust for Nature (TFN) (Vic), for further information on biodiversity conservation. There are extension officers within these organisations who can provide advice on a range of aspects such as; whole farm planning, irrigation design, groundwater management, revegetation and protection of remnant vegetation, threatened species protection and best management practices.

Incentives for On-Ground Works:
There is a range of incentives available for landholders within the Mid Goulburn Broken Catchment for catchment works, including:

- Environmental management incentives - to assist with the protection and/or enhancement of remnant vegetation, including wetlands and grasslands,
- Tree Growing incentives - to assist with the re-establishment of native vegetation,
- Variety of Whole Farm Planning Incentives - to assist with farm management,
  For the above three points, contact the Department of Primary Industries, Benalla (03) 5761 1611.
- Waterways Incentives – for on-ground works along rivers and creeks contact the GBCMA office, Shepparton on (03) 58 201 100.

Management Arrangements:
Programs such as Bush Returns, EcoTender and Bush Broker, may provide incentives and advice, for long-term conservation management on properties. *Contact the GBCMA, Shepparton (03) 58 201 100 or Benalla office (03) 57 611 611 for further information or visit www.gbcma.vic.gov.au*

Permanent Protection:
A Conservation Covenant permanently protects sites for conservation. It may provide assistance for rate relief, tax concessions and incentives for the costs of on-ground works. *TFN (Vic) is the managing organisation in regards to Conservation Covenants; visit their website at www.tfn.org.au*

Other Assistance:

- Goulburn Murray Landcare Network Shepparton – Landcare related advice (www.gmln.org.au)
- Land for Wildlife – a voluntary scheme aiming to encourage and assist landholders to protect and enhance biodiversity values on their properties. *Managed by the Department of Sustainability and Environment – for further information visit* www.dse.vic.gov.au.
- Local Government (Rural City of Benalla and Mansfield Shire) – managing authority for native vegetation statutory planning requirements.

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We also thank numerous Landholders, Landcare Groups, Local Area Planning Groups, Agency representatives and individuals, who provided generous support, advice, information and assistance. This included, guidance, technical knowledge, attendance at meetings, plan review, provision of literature and survey data, and property access.

Thank-you also to person's who have provided photographs. Photographer credit (names) are included under each photograph throughout the report.

A special acknowledgment to all representatives (current and past) on the Goulburn Broken Biodiversity Action Planning (BAP) Steering Committee. This steering committee was established to oversee the BAP process and is responsible for the coordination of BAP, in the Goulburn Broken Catchment. The committee is comprised of personnel from a range of departmental organisations, including the GBCMA, DPI, DSE and TfN (Vic). Core committee members are detailed below, along with contributors to BAP in the Goulburn Broken (eg. meeting attendance, trial implementation, and plan development). Thank you to person's whom have attended meetings as invited guest's (names not listed) and provided valuable comment.

BAP Steering Committee Members:

GBCMA - Barlow, Tim – Manager, Biodiversity Programs, GBCMA (current)
Brunt, Kate – Biodiversity Projects Coordinator, GBCMA (current)
Bell, Kate – (as) Manager, Biodiversity Programs, GBCMA (past)

DPI - Heard, Rebecca – Native Biodiversity Coordinator, DPI (SIR) (current)
Stothers, Kate – Nature Conservation Coordinator, DPI (Dryland) (current)
Williams, Lance – Planning Officer, DPI (SIR) (past)
Sislov, Alex – Team Leader Environment Program, DPI (SIR) (current)

DSE - Merritt, Bronwyn – Biodiversity Landscape Plan Project Officer (Upper) (past)
Rowhan Marshall – Biodiversity Project Officer (current)
Smith, Stephen – Senior Flora and Fauna Officer, DSE (Upper) (past)
Edmonds, Tobi – Threatened Flora Projects Officer, DSE (Lower) (current)
Wilson, (Dr) Jenny – Biodiversity Projects Officer, DSE (Dryland) (past)
Colbourne, Debbie – (as) Flora and Fauna Planner, DSE (Dryland) (past)
Sheahan, Mark – (as) Biodiversity Team Leader, North East, DSE (past)

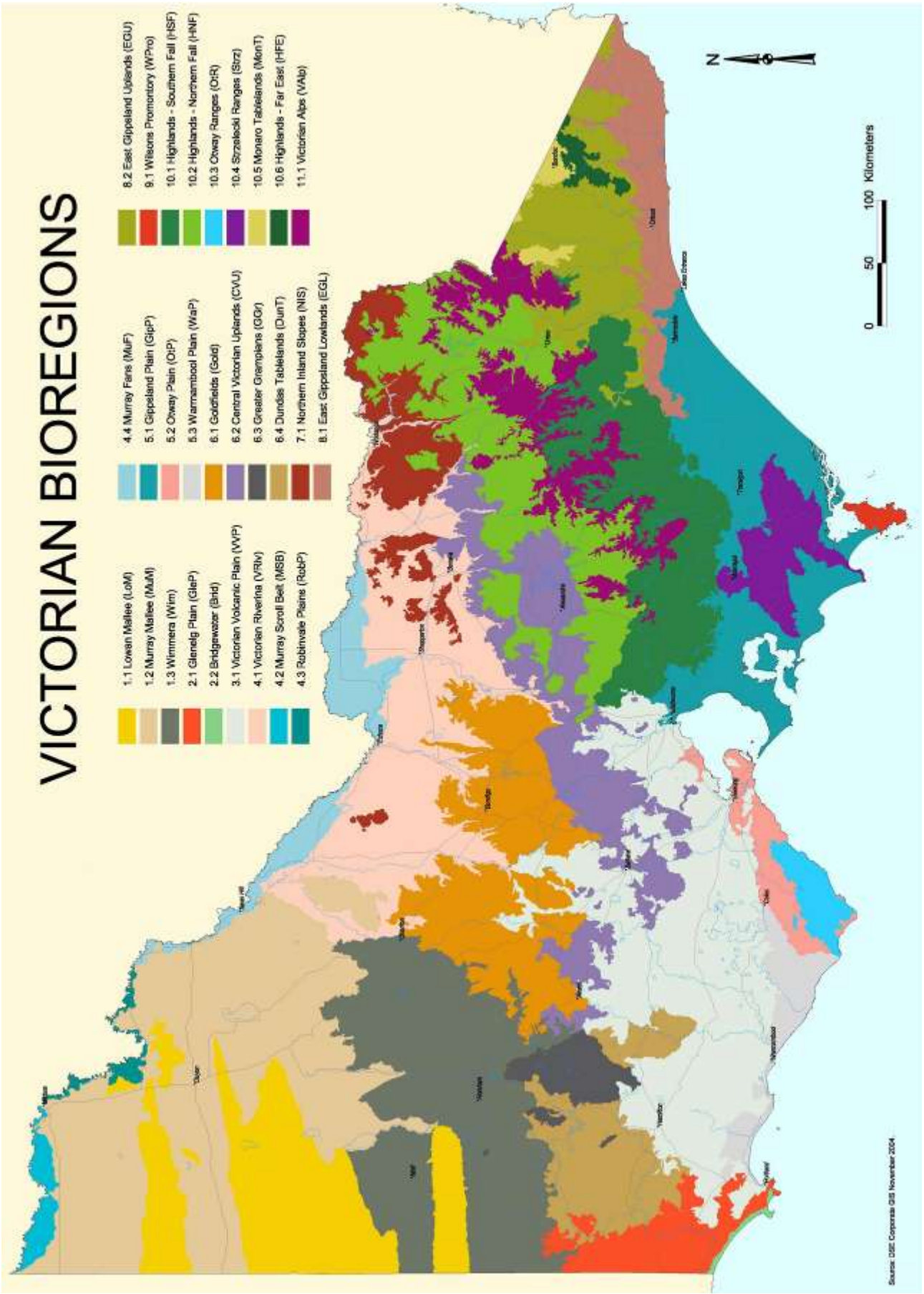
TFN (Vic) - Robinson, (Dr) Doug – Regional Manager, Goulburn Broken – TfN (Vic) (current)

Biodiversity Action Planning Contributors:

Mitchell, Peter – Links Officer, DPI (trial implementation)
Olive, Cathy – Links Officer, DPI (trial implementation)
Weber, Rolf – (as) Acting Biodiversity Team Leader, DSE
Berwick, Sue – (as) Flora and Fauna Planner, DSE (past)
Mentiplay-Smith, Janice - Links Officer, DPI (current)
Howell, Marion – Biodiversity Officer, GBCMA (past)

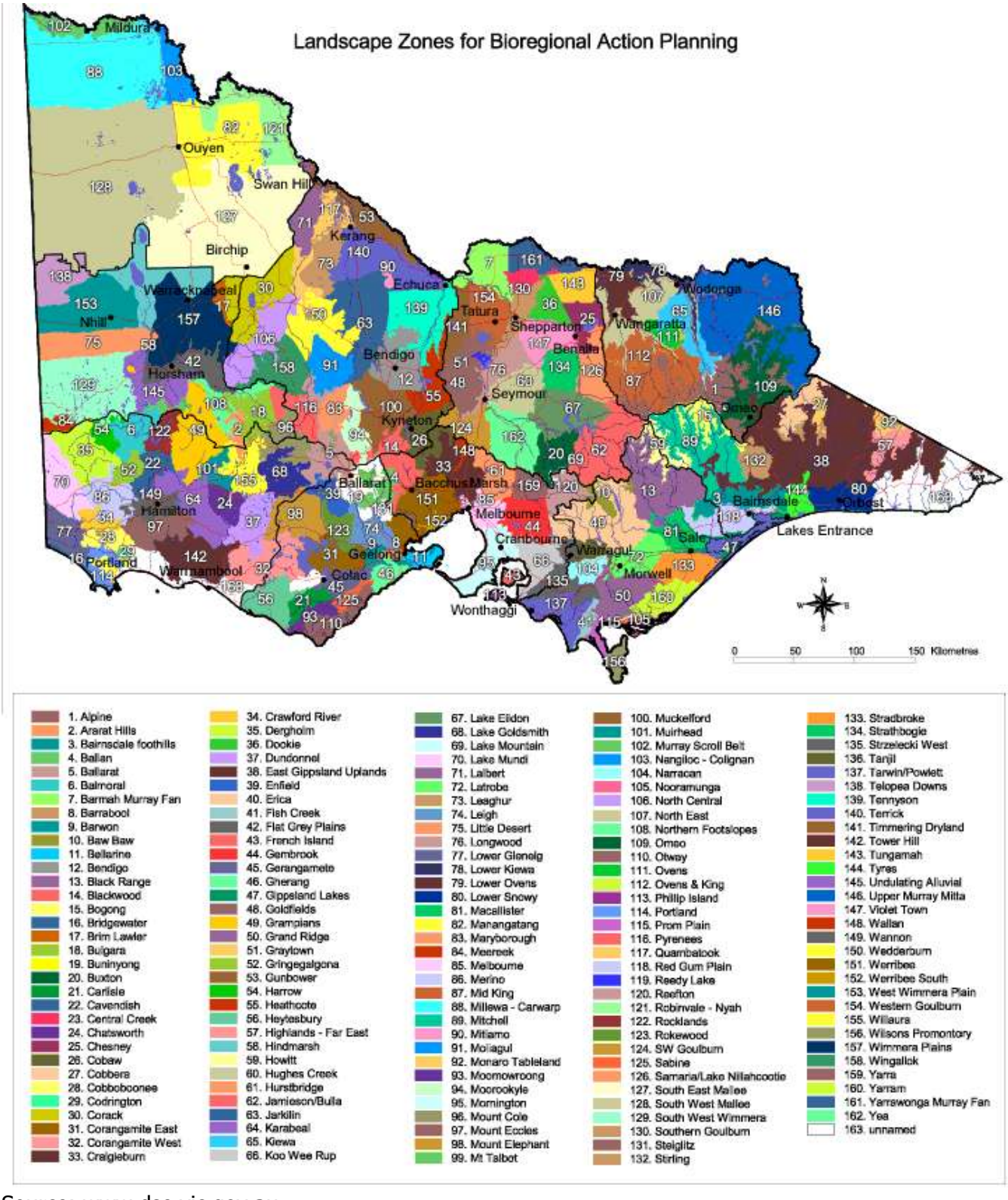
13.0 APPENDICES

APPENDIX 1 – VICTORIAN BIOREGIONS



Source: www.dse.vic.gov.au

APPENDIX 2 – VICTORIAN LANDSCAPE ZONES



Source: www.dse.vic.gov.au

APPENDIX 3 – GOULBURN BROKEN CATCHMENT TARGETS

This Appendix is intended to provide a summary of the Goulburn Broken Regional Catchment Strategy targets and priorities for biodiversity conservation. For further information please refer to GBCMA 2003 or visit www.gbcma.vic.gov.au.

The Goulburn Broken Regional Catchment Strategy identifies the following biodiversity resource condition targets, for native vegetation in the catchment:

1. Maintain the extent of all native vegetation types at 1999 levels in keeping with the goal of 'Net Gain' listed in Victoria's Biodiversity Strategy 1997,
2. Improve the quality of 90% of existing (2003) native vegetation by 10% by 2030,
3. Increase the cover of all endangered and applicable vulnerable Ecological Vegetation Classes to at least 15% of their pre-European vegetation cover by 2030,
4. Increase 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030,
5. Maintain the extent of all wetland types at 2003 levels where the extent (area and number) has declined since European settlement, and
6. Improve the condition of 70% of wetlands by 2030, using 2003 as the benchmark for condition (GBCMA 2003 p11).

Priorities for action to conserve biodiversity in the Goulburn Broken Catchment (GBC) are driven by the conservation significance of the biodiversity asset. Regional investments in biodiversity conservation in the GBC are driven by the following goals (in order of priority):

1. **Protecting** existing viable remnant habitats and the flora and fauna populations they contain (eg. through reservation, covenants, management agreements, fencing and statutory planning),
2. **Enhancing** the existing viable habitats that are degraded (eg. management of threats such as pest plants and animals, grazing, salinity, promotion of natural regeneration and/or revegetation with understorey), and
3. **Restoring** under-represented biodiversity assets to their former extent by revegetation (to create corridors, buffers, patches of habitat) (GBCMA 2003).

APPENDIX 4 –THREATENED FLORA

List of threatened flora and their conservation status in the Samaria Landscape Zone (FIS 2005). Table modified from Anderson et al 2003.

Scientific Name	Common Name	National Status	Vic Status	FFG Status	Species Code
Acacia deanei subsp. paucijuga	Deane's Wattle		r		4201
Aristida calycina var. calycina	Dark Wire-grass		r		3630
Arthropodium sp. 2 (greenish flowers)	Greenish-flower Vanilla-lily		k		5376
Asplenium trichomanes	Common Spleenwort		r		294
Astrotricha linearis	Narrow-leaf Star-hair		r		309
Baumea planifolia	Rough Twig-sedge		k		3722
Billardiera scandens var. brachyantha	Velvet Apple-berry		r		4290
Brachyscome gracilis	Dookie Daisy		v	L	459
Brachyscome ptychocarpa	Tiny Daisy		r		472
Desmodium varians	Slender Tick-trefoil		k		4425
Diuris punctata var. punctata	Purple Diuris		v	L	1084
Dodonaea boroniifolia	Hairy Hop-bush		r		1087
Eleocharis plana	Flat Spike-sedge		v		1144
Eucalyptus alligatrix	Silver Stringybark		r		1262
Eucalyptus alligatrix subsp. limaensis	Lima Stringybark	V	e		4685
Eucalyptus sideroxylon s.s.	Mugga		r		4493
Euchiton umbricola	Cliff Cudweed		r		1475
Goodenia macbarronii	Narrow Goodenia	V	v	L	1513
Goodia medicaginea	Western Golden-tip		r		1518
Hibbertia pedunculata	Stalked Guinea-flower		r		1672
Hypoxis vaginata var. brevistigmata	Yellow Star		k		4583
Hypsela tridens	Hypsela		k		1757
Juncus psammophilus	Sand Rush		r		1836
Leptospermum multicaule	Silver Tea-tree		v		1960
Lepyrodia anarthria	Broom Scale-rush		r		1966
Lotus australis	Austral Trefoil		k		2057
Olearia speciosa	Netted Daisy-bush		k		2326
Oreobolus oxycarpus subsp. oxycarpus	Tuft-rush		r		2356
Poa hothamensis var. parviflora	Soft Ledge-grass		r		4531
Poa labillardierei var. acris	Sharp Mountain Tussock		v		2583
Poa sieberiana var. cyanophylla	Blue-leaf Tussock-grass		k		4866
Pultenaea lapidosa	Stony Bush-pea		v	L	3929
Pultenaea williamsonii	Highland Bush-pea		r		4863
Ranunculus collinus	Strawberry Buttercup		r		2887
Swainsona recta	Mountain Swainson-pea	E	e	L	3326
Thelymitra X irregularis	Crested Sun-orchid		r		3371
Thesium australe	Austral Toad-flax	V	v	L	3389
Wurmbea biglandulosa subsp. biglandulosa	Glandular Early Nancy		r		3580

Definitions - E: endangered in Australia; k: poorly known in Victoria; e: endangered in Victoria; v: vulnerable in Victoria; r: rare in Victoria; L: listed under FFG; N: nominated under FFG

APPENDIX 5 – THREATENED FAUNA

List of threatened fauna and their conservation status in the Samaria Landscape Zone (VFD 2005). Table modified from Anderson et al 2003.

Scientific Name	Common Name	National Status	Victoria Status	FFG Status	Species Code
Xanthomyza phrygia	Regent Honeyeater	EN	CR	L	603
Vermicella annulata	Bandy Bandy		NT	L	2734
Varanus varius	Tree Goanna		VU		2283
Stagonopleura guttata	Diamond Firetail		VU	L	652
Rhinolophus megaphyllus	Eastern Horseshoe Bat		VU	L	1303
Pseudophryne bibronii	Brown Toadlet		EN		3117
Pseudomys fumeus	Smoky Mouse	EN	EN	L	1458
Pomatostomus temporalis	Grey-crowned Babbler		EN	L	443
Platalea regia	Royal Spoonbill		VU		181
Phascogale tapoatafa	Brush-tailed Phascogale		VU	L	1017
Phalacrocorax varius	Pied Cormorant		NT		99
Petaurus norfolcensis	Squirrel Glider		EN	L	1137
Nycticorax caledonicus	Nankeen Night Heron		NT		192
Ninox strenua	Powerful Owl		VU	L	248
Neophema pulchella	Turquoise Parrot		NT	L	302
Melithreptus gularis	Black-chinned Honeyeater		NT		580
Melanodryas cucullata	Hooded Robin		NT	L	385
Macquaria australasica	Macquarie Perch	EN	EN	L	4096
Maccullochella peelii peelii	Murray Cod	VU	EN	L	4094
Maccullochella macquariensis	Trout Cod	EN	CR	L	4093
Litoria raniformis	Growling Grass Frog	VU	EN	L	3207
Lathamus discolor	Swift Parrot	EN	EN	L	309
Haliaeetus leucogaster	White-bellied Sea-Eagle		VU	L	226
Grantiella picta	Painted Honeyeater		VU	L	598
Galaxias rostratus	Flat-headed Galaxias		DD		4037
Euastacus armatus	Murray Spiny Cray		DD	L	5041
Dasyurus maculatus	Spot-tailed Quoll	VU	EN	L	1008
Climacteris picumnus	Brown Treecreeper		NT		555
Cinclosoma punctatum	Spotted Quail-thrush		NT		436
Chthonicola sagittata	Speckled Warbler		VU	L	504
Chrysococcyx osculans	Black-eared Cuckoo		NT		341
Canis familiaris dingo	Dingo		DD		1835
Burhinus grallarius	Bush Stone-curlew		EN	L	174
Biziura lobata	Musk Duck		VU		217
Aythya australis	Hardhead		VU		215
Ardea alba	Great Egret		VU	L	187
Anas rhynchotis	Australasian Shoveler		VU		212
Alcedo azurea	Azure Kingfisher		NT		319

Definitions: CAMBA listed (China-Australia Migratory Bird Agreement); JAMBA listed(Japan-Australia Migratory Bird Agreement); V: vulnerable in Australia; E: Endangered in Australia; c: critically endangered in Victoria; e: endangered in Victoria; v: vulnerable in Victoria; n: near threatened in Victoria; L: listed under FFG

APPENDIX 6 – SITE PRIORITISATION METHOD

To determine the conservation significance and the need for ground-truthing (surveying), sites were prioritised according to the following table (GBCMA *in prep.*). If ground-truthing was required and no survey was completed (eg. more than 100 sites required survey), the minimum priority status was applied. *LCM refers to the Landscape Context Model.

Conservation Status of EVC	Potential habitat within known dispersal range of threatened taxon or focal species, or within priority areas as identified by LCM*	EVC Patch Size	Ground-truthing required to confirm priority rank on basis of vegetation condition	Priority Status: Very High, High, Medium, Low
Endangered	Y	<5ha	Ground-truthing needed	VH or H
E	N	<5ha	Ground-truthing needed	VH or H
E	Y	5-10ha	Ground-truthing needed	VH or H
E	N	5-10ha	Ground-truthing needed	VH or H
E	Y	11-40ha		VH
E	N	11-40ha		VH
E	Y	>40ha		VH
E	N	>40ha		VH
Vulnerable	Y	<5ha	Ground-truthing needed	M, H or VH
V	N	<5ha	Ground-truthing needed	M or H or VH
V	Y	5-10ha	Ground-truthing needed	M, H or VH
V	N	5-10ha	Ground-truthing needed	M or H or VH
V	Y	11-40ha		VH
V	N	11-40ha	Ground-truthing needed	H or VH
V	Y	>40ha		VH
V	N	>40ha		VH
Rare	Y	<5ha	Ground-truthing needed	M, H or VH
R	N	<5ha	Ground-truthing needed	M or H or VH
R	Y	5-10ha	Ground-truthing needed	M, H or VH
R	N	5-10ha	Ground-truthing needed	M or H or VH
R	Y	11-40ha		VH
R	N	11-40ha	Ground-truthing needed	H or VH
R	Y	>40ha		VH
R	N	>40ha		VH
Depleted	Y	<5ha	Ground-truthing needed	M or H
D	N	<5ha	Ground-truthing needed	L or M
D	Y	5-10ha	Ground-truthing needed	M or H
D	N	5-10ha	Ground-truthing needed	L, M or H
D	Y	11-40ha		H
D	N	11-40ha	Ground-truthing needed	M or H
D	Y	>40ha		VH
D	N	>40ha		VH
Least Concern	Y	<5ha		M
LC	N	<5ha		L
LC	Y	5-10ha		M
LC	N	5-10ha	Ground-truthing needed	L or M
LC	Y	11-40ha	Ground-truthing needed	M or H
LC	N	11-40ha	Ground-truthing needed	L or M
LC	Y	>40ha	Ground-truthing needed	H or VH
LC	N	>40ha	Ground-truthing needed	H or VH

APPENDIX 7 – VEGETATION QUALITY ASSESSMENT FORM

Refer to DSE 2004 for further information on assessments. Recording of site information and other factors (eg. threatening processes) was also recorded at each of the surveyed sites.

BAP – Vegetation Quality Assessment Sheet (Woodlands and Forests)

USE OTHER SHEETS FOR WETLAND AND GRASSLAND

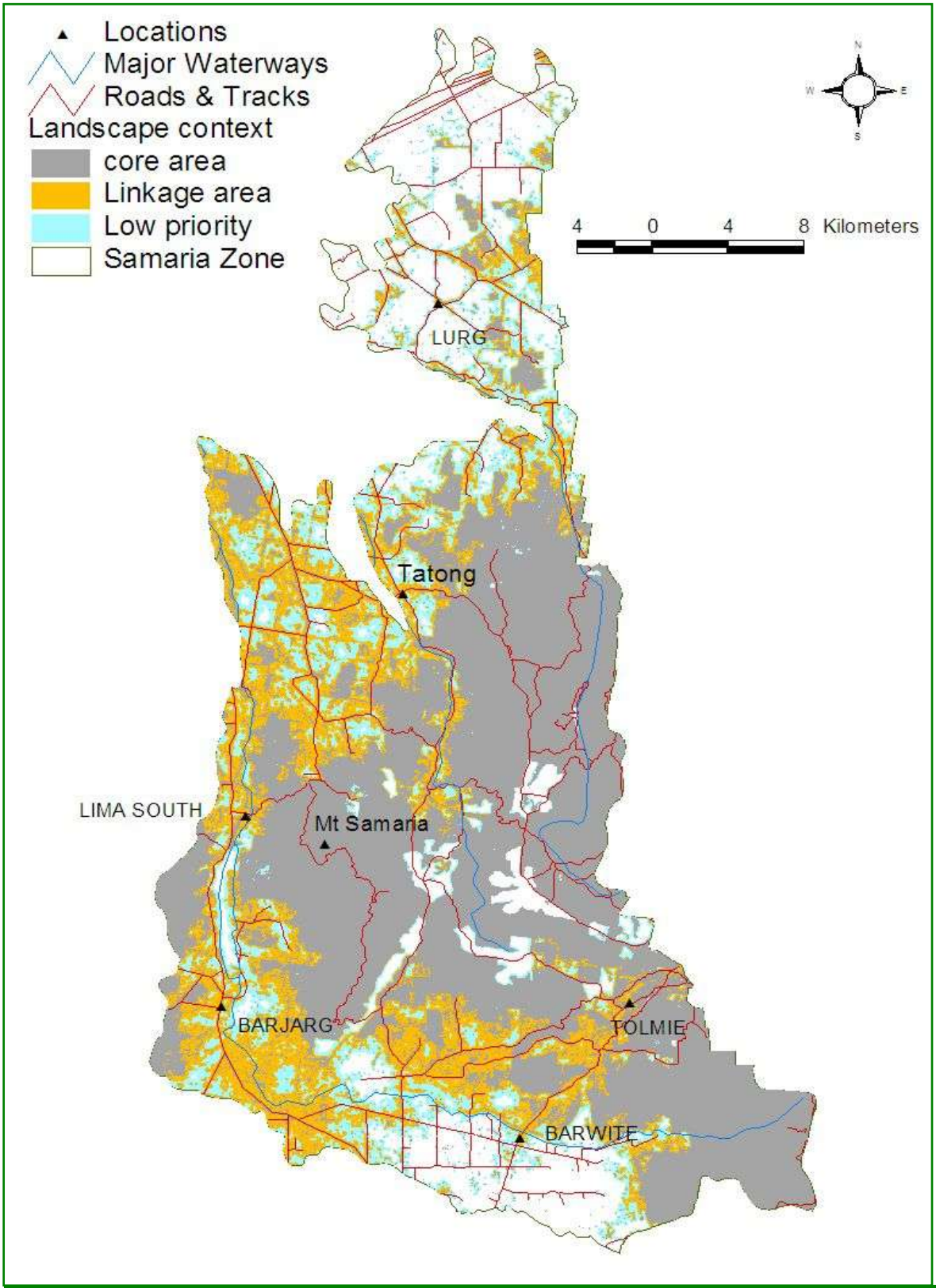
Date:
Assessor:
BAP Zone: BAP Site No:
Map: Easting: Northing:

	TARGET	QUALITY RANKING	WEIGHT	VALUE
LARGE TREES (over 50cms) Apply to living and dead	10-15/ha in woodlands 20/ha in forests	No large trees	0	
		Present but not common Woodlands, up to 7/ha Forests, up to 12/ha	1	
		Common Woodlands, more than 7/ha Forests, more than 12/ha	2	
CANOPY COVER (use all trees over 80% of their mature height)	10-20% in woodlands 20-50% in forests	Very substantially reduced (<25% of benchmark)	0	
		Significantly reduced (25-50% of benchmark)	0.5	
		Comparable to benchmark, although it may be reduced (>50% of benchmark)	1	
UNDER-STOREY Include shrubs, grasses, herbs and young regenerating trees	**Cover** of native species – 90-100% in woodlands and forests; **Diversity** of lifeforms - 25-35 species in woodlands and forests.	Absent or virtually so (<10% total expected cover)	0	
		Native cover greatly reduced (10-25% total expected cover)	2	
		Native cover somewhat reduced, **low** diversity (25%-75% total expected cover, < 50% diversity)	3	
		Native cover somewhat reduced, **high** diversity (25% - 75% total expected cover, >50% diversity)	4	
		Native cover little reduced, high diversity (>75% total expected cover, >50% diversity)	5	
WEEDS	% cover	Dominated by exotic species (>50% cover)	0	
		Exotic species common but not dominant (25 – 50% cover)	1	
		Exotic species present but not common (5 – 25% cover)	2	
		Exotic species absent or very rare (<5% cover)	3	

RECRUIT-MENT	Include all components - trees, shrubs, grasses and herbs.	Recruitment absent or, if present then only for a minority of species (<30% of species)	0	
		Recruitment common but not for all species (30-70%)	1	
		Very common for most life forms (>70% of species)	2	
ORGANIC LITTER	20% cover in woodlands	Organic litter absent or significantly reduced from benchmark level (< 50%)	0	
		Organic litter present and not significantly reduced from benchmark level (>50%)	1	
LOGS m/Ha	100m in woodlands, 150m in forests	Logs and/or cut stumps absent or significantly reduced from benchmark (< 25%)	0	
		Logs and/or cut stumps common but reduced from benchmark (25 – 50%)	0.5	
		Logs and/or cut stumps present and not significantly reduced from benchmark (>50%)	1	
SIZE	Area	< 2 ha	0	
		2 – 10 ha	1	
		> 10 ha	2	
NEIGH-BOURHOOD	Within 1 km radius, % area covered by indigenous vegetation	< 10% cover	0	
		20 – 60% cover	1	
		> 60% cover	2	
Distance to the nearest 'core area'	'Core area' is a block of native vegetation > 50 Ha	> 1 km from 'core area'	0	
		< 1 km from 'core area'	1	
			TOTAL	

APPENDIX 8 – LANDSCAPE CONTEXT MODEL (LCM)

The Landscape Context Model Mapping is now also contained on the BAP CD (Version 1, January 2008)* or on the GBCMA website (www.gbcma.vic.gov.au). This mapping can be used in conjunction with the BAP mapping and this Conservation Plan.



LANDSCAPE CONTEXT MODEL – displaying linkages and potential BAP sites

* To obtain copies of the BAP CD (Version 1, January 2008), or for further information on BAP, please contact bap@gbcma.vic.gov.au OR the Biodiversity Action Planning Officer, Department of Sustainability and Environment (DSE) Benalla at Ph: (03) 57 611 611

APPENDIX 9 – PRIORTY SITE INFORMATION (MAPPING):

Mapping and accompanying information for each of the 'priority BAP sites' is now contained on the BAP CD (Version 1, January 2008) or on the GBCMA website (www.gbcma.vic.gov.au). This mapping data is designed to be used in conjunction with this Conservation Plan to assist users to obtain further information on priority sites.

HOW TO OBTAIN INFORMATION FROM THE BAP CD:

1. Locate the available mapping data by clicking on the 'BAP Mapping' hyperlink#.
2. Click on the hyperlink relating to the Zone of interest under the 'BAP Mapping' subheading' (e.g. 'Barmah').
3. This will lead to a map identifying priority BAP sites within the chosen Zone.
4. On this map, locate the area/site of interest by clicking on the area.
5. Zoom in or out to the areas/sites of interest, using the North, South, East, West arrows.
6. Click on a BAP site to view the Attribute Table information for that site.
7. Refer to the list of birds surveyed at each site (where available).
8. An explanation of the data provided in the Attribute Table, is provided in the 'Attribute Table Definition' document under the BAP Mapping Subheading
9. For further information to assist with the identification of opportunities to link the BAP sites, refer to 'BAP Mapping', 'Landscape Context Model Maps' and choose the relevant Zone name hyperlink(e.g. 'Barmah').
10. To access the data via the Geographical Information System (GIS) (where available) select 'BAP Mapping',
11. 'GIS data' then either 'BAP GIS layer' or 'LCM GIS layer'.

Note: Mapping data for each Landscape Zone can also be located by clicking on the 'BAP Zones' hyperlink and choosing the Landscape Zone of interest from the map of the Goulburn Broken Catchment.

To obtain copies of the BAP CD (Version 1, January 2008), or for further information on BAP, please contact bap@gbcma.vic.gov.au OR the Biodiversity Action Planning Officer, Department of Sustainability and Environment (DSE) Benalla at Ph: (03) 57 611 611